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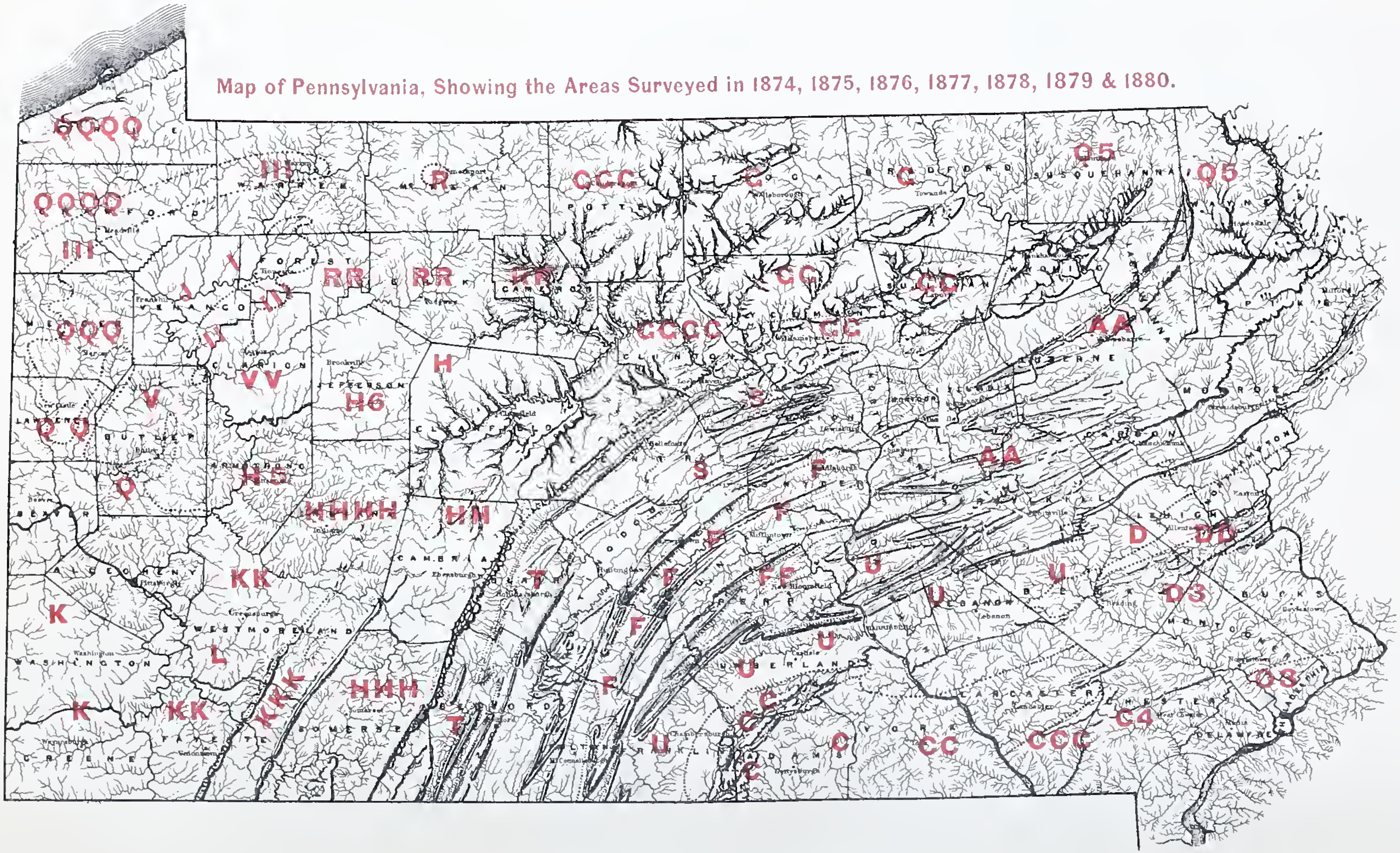
Map of Pennsylvania, Showing the Areas Surveyed in 1874, 1875, 1876, 1877, 1878, 1879 & 1880.



SECOND GEOLOGICAL SURVEY OF PENNSYLVANIA:
1879-1880.
M^3.

THIRD

REPORT OF PROGRESS

IN THE

LABORATORY OF THE SURVEY

AT

HARRISBURG,

BY

ANDREW S. McCREATH.

WITH 2 INDEXES AND MAP.

HARRISBURG:
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223 MARKET STREET,
HARRISBURG, *April 15, 1881.*

Prof. J. P. LESLEY,
State Geologist:

DEAR SIR: I herewith present my third report of the work of the Laboratory of the Survey, being a record of all the analyses made since the publication of Volume MM.

A considerable portion of my time last summer was spent in visiting the principal iron ore mines of the Cumberland Valley, and selecting average specimens of the ores for analysis. In the prosecution of this work I have to acknowledge the valuable assistance received from Col. Geo. B. Wiestling, Supt. Mont Alto Iron Works; T. B. Kennedy, Esq., President of the Cumberland Valley railroad; Henry McCormick, Esq., Harrisburg; and Mr. Daniel King, Supt. Pine Grove Iron Works. To these gentlemen especially, and to several others who furnished me with information in regard to the location of the different ore banks, I desire to tender my hearty thanks.

I would also mention, in terms of the highest praise, the valuable assistance and coöperation which I have at all times received from Mr. John M. Stinson, my assistant in the Laboratory.

It is proper that I should here correct a mistake which occurred in my Report MM, and which I only saw after the volume had been issued. My name should not appear on Plate I, page 404, in connection with an apparatus for carbon determinations. This apparatus was designed by Mr. Andrew A. Blair; and I make this correction in justice to myself as well as to Mr. Blair, who alone is entitled to the credit of the Plate, as explained in my foot note, page 404, MM.

Yours respectfully,
ANDREW S. McCREATH.

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PREFACE.

Everywhere throughout Pennsylvania wherever the great limestone formation No. II occurs, there are found more or less important deposits of brown hematite iron ore. It is this horizon which has supplied the greater part of the stock to the furnaces along the Lehigh, Schuylkill and Susquehanna rivers, and the whole of the stock to the old furnaces of the Kishicoquilis, Nittany, and Canoe valleys, and Morrison's Cove, in Middle Pennsylvania, as well as to the furnaces in Mountain Creek valley in Cumberland county, and Path valley and the Conecocheague region of Franklin county.

They are scattered over the surface of the southern or limestone half of the Cumberland valley, from the Lehigh river to Maryland, and southward through Virginia and East Tennessee to Alabama. (MM, p. 199.) But they are distinguishable into ores at the top, ores in the middle, and ores at the bottom of the great limestone formation No. II. Those at the top form a belt along the middle of the valley where the Magnesian limestone underlies the Trenton limestone, or in its absence the Utica or Hudson river slates, formation No. III. This line of ore deposits is represented by the great mines of Ironton in Lehigh and Moselm in Berks counties; the mines along Spruce creek in Centre and Blair; the Henrietta, Leathercracker and Bloomfield mines in Morrison's Cove, Blair county; and the old Mt. Pleasant and Carrick furnace banks in Path valley, Franklin county.

Those in the middle are connected with various horizons of ferruginous limestones in the chazy and calciferous. Those at the bottom, along the north or west foot of the South Mountain–Blue Ridge range, are geologically connected with the Pottsdam sandstone, or the slates which

intervene between it and the base of the calciferous, and are *locally* known as "Mountain ores." This lower line of ore deposits is represented by the great mines of Springfield in Canoe valley, Blair county; at Pine Grove, Boiling Springs and at the No. 1 Clever mammoth bank in Cumberland county; at Pond bank and Mont Alto in Franklin county; and a long line through the Shenandoah valley in Virginia.

In the Cumberland valley in York, Cumberland and Franklin counties these ores have been very extensively mined both for local use in the furnaces of the valley and for shipment to Harrisburg, Reading, Columbia, &c., to be smelted along with the more refractory magnetites. The best developments have been made along the line of the South Mountain railroad; at Boiling Springs; at Cleversburg; and near Shippensburg in Cumberland county; along the line of the Mont Alto railroad: and in Path valley in Franklin county; and on Dogwood run in York county.

Near Dillsburg in York county there is an important group of magnetic iron ore mines, connected with the Mesozoic sandstone, which have of late received considerable attention from owners of blast furnaces. These ores, carrying only a small percentage of phosphorus, have been largely used in the manufacture of Bessemer pig iron. Some of them carry a considerable percentage of sulphur as iron pyrites, and all of them contain large quantities of lime and magnesia in the form of *silicates*. In this and in many other respects they resemble the celebrated Cornwall ore of Lebanon county.

In addition to the ores mentioned above, there are found near Mercersburg and at other localities in Franklin county important deposits of *bog ore*, which are now being quite extensively developed. From 1876 to 1880 nearly ten thousand tons of this ore were mined, nearly four thousand tons of it during 1880. The ore is generally found in the slates of formation No. III, and has evidently resulted from the decomposition of iron pyrites, the large percentage of sulphuric acid which they invariably carry going to confirm this view. They are characterized by an almost uni-

formly *low percentage of phosphorus* and by being practically free from manganese.

In Warren township, Franklin county, formation No. VIII is exposed. This sometimes carries iron ore deposits of considerable importance. The Marcellus ore bed of this formation immediately underlies the black slates and overlies the green calcareous shales. But the ore is extremely variable in thickness. Sometimes the bed is so thin that it is not worth working, while, on the other hand, it is often 10 or 12 feet thick. The ore is a brown hematite only at the outcrop; deep mining always shows an earthy carbonate of iron, or a dark pyritous clay. In Huntingdon, Juniata and Perry counties considerable quantities of ore have been mined from this horizon. The ore is generally of good quality, being comparatively rich in iron and low in phosphorus.

The following table has been prepared to show, in a condensed form, the general average character of the Cumberland Valley ores, and, also, the proportion of phosphorus which each will yield in 100 parts iron. The analyses are arranged in order, according to the amount of phosphorus in 100 parts iron.

TABLE I.

No. of ore bank.	NAME OF ORE BANK.	Per cent. iron.	Per cent. manganese.	Per cent. phosphorus.	Phosphorus in 100 parts iron.
93*a* .	Landis or Fuller—Upper level, . . .	48.350	.122	.018	.037
88 . .	Longnecker—Old opening, ...	38.350	.079	.016	.041
86 . .	Bell, ...	42.550	.108	.019	.044
92 . .	Logan, ...	45.880	.144	.023	.050
93 . .	Landis or Fuller—Lower level, . . .	44.900	.272	.023	.051
85 . .	Shelly & Hoffer, ...	37.575	.120	.023	.061
91 . .	Mumper, ...	38.100	.100	.024	.063
89 . .	Longnecker—New opening, ...	43.000	.079	.029	.067
90 .	Underwood, ...	40.200	.072	.030	.074
36 . .	Lime Kiln, ...	48.100	2.572	.040	.083
2 . .	Richmond bog, ...	40.550	trace.	.036	.088
10 . .	Stouffer, ...	40.850	trace.	.037	.090
87 . .	McClure, ...	45.000	.028	.047	.104
14 . .	Garlic, ...	52.912	.079	.056	.105
33 . .	Pond No. 2, ...	48.600	2.154	.059	.121
9 . .	Leib, ...	35.200	trace.	.046	.130
16 . .	George Rock, ...	40.450	1.023	.054	.133

No. of ore bank.	Name of Ore Bank.	Per cent. iron.	Per cent. manganese.	Per cent. phosphorus.	Phosphorus in 100 parts iron.
28	Thomas Calliman,	47.500	1.578	.070	.147
41	Wiestling,	54.950	.324	.087	.158
56	Calico—Rutherford,	50.300	.094	.086	.170
55	Calico—Coover,	47.550	.094	.086	.180
1	Bowers' furnace,	47.000	.410	.085	.180
25	Mine No. 8—Mont Alto,	54.200	.569	.100	.184
39	Promise,	54.600	.336	.104	.190
31	Ruth,	51.600	.057	.100	.193
72	J. C. Lehman No. 2,	43.950	.124	.087	.197
43	Ahl—Pipe ore,	55.150	.165	.114	.206
37	Guilford,	52.500	.663	.114	.217
42	Wm. L. Chambers,	53.000	.057	.117	.220
40	White Roek,	47.962	.477	.109	.227
30	Luey,	48.050	1.772	.110	.228
11	R. P. McFarland,	35.750	trace.	.087	.243
54	John Bridges,	52.950	.266	.131	.247
51	John H. Cressler,	48.850	.245	.146	.298
44	McHose,	44.950	1.203	.138	.307
34	Pond No. 1,	50.550	.309	.157	.312
27	John Small,	52.800	.619	.189	.357
61	Peffer,	54.200	.086	.206	.380
76	Pepper,	45.100	.230	.176	.390
15	Robert McCleary,	52.950	.403	.215	.406
29	Jacob Roek,	47.350	.749	.197	.416
65	Laurel No. 1,	38.100	7.226	.169	.443
23	Mine No. 4—Mont Alto,	48 450	1.592	.219	.452
45	Joseph Cressler,	38.600	.698	.178	.461
24	Mine No. 5—Mont Alto,	46 350	1.271	.236	.509
68	Henry Clay No. 1,	35.850	2.247	.184	.513
50	Means,	48.450	2.031	.251	.518
18	Wyeth Douglas,	43.700	.165	.263	.601
46	Jaeob Koser,	47.000	1.260	.296	.629
81	Heck,	44.500	.309	.289	.649
63	Pine Grove,	42.150	2.709	.275	.652
22	Mine No. 3—Mont Alto,	42.450	2.543	.281	.661
4	Beaver,	42.400	1.441	.282	.665
70	Koontz & Myers,	34.500	.453	.235	.681
26	Benjamin George,	47.750	.872	.338	.708
3	Old Mount Pleasant,	47.500	2.334	.339	.713
59	Big Pond,	44.000	1.275	.318	.722
6*a*	Old Carriek furnace—*Wash*,	36.400	1.758	.267	.733
82	Coover & Wolf,	45.500	1.304	.342	.751
57	Chestnut,	40 600	.844	.308	.758
79	Leidig & Hoffer,	48.700	.245	.380	.780
6	Old Carriek furnaee—*Lump*,	45.300	1.102	.355	.783
8	George Weinman,	48.200	1.066	.415	.861
67	Henry Clay No. 2,	36.850	1.513	.320	.868
74	Mullen,	44.900	1.837	.392	.873
21	Mill bank,	48.250	.180	.439	.909
19	David Mentzer,	46.900	.094	.442	.942
32	McNeal,	46.250	.432	.437	.944
68*a*	Henry Clay No. 1—*Lump*,	50.250	.072	.513	1.020
38	Hope,	42.900	.540	.464	1.081
58	George H. Clever,	50.620	2.111	.553	1.090
20	Smith, Dunean & Avery,	37.050	.389	.415	1.120
83	C. H. Bender,	45.050	.410	.511	1.134

No. of ore bank.	Name of Ore Bank.	Per cent. iron.	Per cent. manganese.	Per cent. phosphorus.	Phosphorus in 100 parts iron.
52 . .	George Clever, ...	44.950	.987	.535	1.190
64 . .	Laurel No. 2, ...	40.600	3.069	.491	1.209
49	Gochenauer & Rohrer, ...	43.750	1.356	.531	1.213
17 . .	Pass Orchard, ...	37.750	.093	.469	1.242
53*a*	"No. 1 Clever," see note, page 16, . .	47.900	5.987	.663	1.384
12 . .	Webster, ...	44.700	.202	.636	1.422
47 . .	Old Southampton, ...	45.550	.728	.689	1.512
13 . .	Squire Stinger, ...	39.500	4.791	.606	1.534
66 . .	Henry Clay No. 3, ...	41.350	1.253	.666	1.610
48 . .	Ruby or Plaster, ...	37.200	1.642	.616	1.650
60 . .	Old Peach Orchard, ...	44.950	1.693	.746	1.659
69 . .	Diven tract, ...	45.150	.353	.774	1.714
71*a* .	Grove—*Lump*, ...	46.900	1.282	.809	1.725
80 . .	Wolf, ...	40.950	.497	.711	1.736
5 . .	Jennings Jones, ...	41.050	.396	.744	1.812
78*a* .	Beltzhoover—Wash, ...	36.950	1.347	.740	2.003
84 . .	McCormick & Co.—Atticks, ...	44.000	1.261	.951	2.161
35 . .	English, ...	38.350	3.134	.849	2.213
78 . .	Beltzhoover,—Lump, ...	40.900	2.594	.909	2.222
71 . .	Grove—Wash, ...	36.100	1.578	.915	2.534
62 . .	Wild Cat, ...	48.200	.367	1.365	2.831
77 . .	Ege—Lump, ...	34.350	4.539	1.079	3.141
75 . .	Strickler, ...	42 950	.093	1.392	3.240
77*a* .	Ege—Wash, ...	32.150	3.112	1.059	3.293
73*a* .	Mount Holly, Medlar—Lump, . . .	48.500	.727	1.619	3.338
7 . .	Railroad—Carrick, ...	43.600	.238	1.482	3.399
73 . .	Mount Holly—Medlar, ...	38.250	2.730	1.373	3.589
53 . .	No. 1 Clever, ...	36.800	5.620	1.787	4.856

The numbers in the left hand column of the above table indicate the geographical position of the ore banks on the map accompanying this report. A single glance will suffice to show how irregularly these numbers follow each other; and, since the analyses are arranged in the table on the basis of phosphorus in 100 parts iron, this great irregularity would seem to indicate that, except perhaps merely in a very general way (see Table II) there is no intimate relationship between the *geographical* position of the ore bank and the contents of phosphorus in the ore. It is true that lines drawn in a different direction, or on a *geological* basis, might show some such connection; but it is unsafe to assume, as is too frequently done, that ores located geographically near each other should carry about the same percentage of phosphorus. This point is very clearly brought out by compar-

ing analyses Nos. 6, 6*a* and 7; Nos. 45 and 46; Nos. 71 and 72 and Nos. 83 and 84.

The contents of phosphorus in samples of ore from different parts of the same bank will often be found to vary considerably. Indeed, numerous analyses made by me during the past ten years have fully convinced me on this point, as I have found samples taken from different places in the same ore bank to vary as much as .21, and that too in a bank whose average ore carries only a little over a quarter of one per cent. of phosphorus. This point becomes of importance to those who are mining ores for use in the manufacture of pig-iron for the Bessemer process, in which, as at present worked in this country, only a small percentage of phosphorus is admissible. It will be noticed from the preceding table that while only a few of the Cumberland Valley ores can be used *per se* for the manufacture of Bessemer pig-iron, there are a great many of them which could be used to advantage as an admixture along with less phosphoric ores.

It will be interesting to mention here a recent discovery in metallurgy by which dephosphorization of pig-iron can be accomplished in the Bessemer converter. This is the so-called Thomas-Gilchrist or basic process. It consists simply in lining the converter with a non-silicious material consisting chiefly of lime, magnesia and alumina, and by adding a small quantity of lime to the pig-iron during the process of conversion. By this means a basic cinder is produced which carries off practically the whole of the phosphorus. Experiments have fairly demonstrated the fact that by using this process a *good quality of steel can now be made from pig-iron containing over two per cent. of phosphorus.* The practical effect of the introduction of this process on a large scale will be that, since a good quality of steel can now be made from pig-iron high in phosphorus, those ores which have hitherto been neglected on account of their high percentage of phosphorus, will now be largely mined. Many of the ores of the Cumberland Valley are peculiarly adapted for the manufacture of pig-iron intended for conversion into steel by the "basic process;" and as they occur in great

abundance and can be economically mined their rapid development in the near future should be assured.

It will be interesting to obtain a general idea of the average character of the ores in the different districts. I have therefore prepared the following Table II in which the averages of a number of samples from each district are given. In preparing the table I have selected only the well developed banks for each different group, excluding all analyses of samples from mere trial shafts or pits, as it is believed that this plan will show better the average character of the ores as at present developed.

Table III will show the extreme limits of variation in the different elements included in Table II.

Table II.

Average per centage of Iron, Manganese and Phosphorus in certain groups of ore. [Cumberland Valley:]

No. of samples.	Name of Group.	Iron.	Manganese.	Total iron and manganese.	Phosphorus.	Phosphorus in 100 parts iron.
6	I. South Pennsylvania R.R. *Brown Hematites*,	44.341	1.009	45.350	.522	1.177
4	II. South Pennsylvania R.R. *Bog ores*, ...	38.087	trace.	38.087	.051	.133
13	III. Mont Alto Railroad, . . .	46.054	1.114	47.168	.268	.581
6	IV. Shippensburg "*Limestone ores*,"	46.208	.599	46.807	.155	.335
8	V. Shippensburg "*Mountain ores*,"	42.933	1.820	44.753	.667	1.553
12	VI. South Mountain Railroad,	40.083	2.057	42.140	.537	1.334
4	VII. Boiling Springs, . . .	36.087	2.898	38.985	.947	2.624
3	VIII. Dogwood Run (Dillsburg), *Brown Hematites*, . . .	43.650	.703	44.353	.447	1.024
6	IX. Dillsburg *Magnetites*, . .	43.875	.102	43.977	.028	.063

Group I includes analyses Nos. 1, 3, 4, average of 6 and 6*a*, 7 and 12.

Group II includes analyses Nos. 2, 9, 10 and 11.

Group III includes analyses Nos. 15, 16, 18, 20, 21, 22, 23, 24, 25, 29, 33, 34 and 35.

Group IV includes analyses Nos. 44, 45, 46, 51, 55 and 56.

Group V includes analyses Nos. 47, 48, 49, 52, 53, 57, 58 and 59.

Group VI includes analyses Nos. 63, 64, 65, 66, 67, 68, 70, average of 71 and 71*a*, 72, 73, 74 and 75.

Group VII includes analyses Nos. 77, 77*a*, 78 and 78*a*.

Group VIII includes analyses Nos. 80, 81, 82.

Group IX includes analyses Nos. 86, 87, 89, 90, 92 and average of 93 and 93*a*.

TABLE III.

Extreme limits of variation in the percentages of Iron, Manganese and Phosphorus given in Table II.

No. of Group.	Iron.	Manganese.	Phosphorus.
I,	40.85 to 47.50	.202 to 2.334	.085 to 1.482
II,	35.20 to 40.85	trace.	.036 to .087
III,	37.05 to 54.20	.165 to 3.134	.054 to .849
IV,	38.60 to 50.30	.094 to 1.260	.086 to .296
V,	36.80 to 50.62	.728 to 5.620	.308 to 1.787
VI,	34.50 to 44.90	.093 to 7.226	.087 to 1.392
VII,	32.15 to 40.90	1.347 to 4.539	.740 to 1.079
VIII,	40.95 to 45.50	.309 to 1.304	.289 to .711
IX,	40.20 to 46.62	.028 to .182	.019 to .047

Notes.

1. It will be interesting here to notice the occurrence of a peculiar variety of iron ore in the Grove bank, near Hunter's Run Station, Cumberland county. It has the *general appearance* of a *micaceous red hematite*, and has undoubtedly been frequently mistaken for this variety of ore. It occurs in fibrous radiating masses, sometimes coating the ordinary brown hematite, and occasionally in separate small lumps. A partial analysis of a tolerably pure specimen of the ore is given herewith ; and in order to make its analysis more striking, the analysis of the ore with which it is found associated is given for comparison.

	"*Grove lump ore.*"	"*Red, fibrous variety.*"
Sesquioxide of iron,	67.000	80.714
Sesquioxide of manganese,	1.841	3.973
Sesquioxide of cobalt,	.170	.090
Alumina,	3.910	2.427*

* Undetermined matter.

Lime,	.210	.030
Magnesia,	.183	.129
Sulphuric acid,	.007	none.
Phosphoric acid,	1.852	.210
Water,	10.870	11.605
Silicious matter,	13.370	.822
	99.413	100.000
Metallic iron,	46.900	56.500
Metallic manganese,	1.282	2.766
Sulphur,	.003	none.
Phosphorus,	.809	.092
Phosphorus in 100 parts iron,	1.725	.163

---

2. In several of the "limestone ore" banks near Shippensburg quite a quantity of "sand" is sometimes found among the wash ore. Where the amount is excessive it is usually separated by screening. It consists generally of more or less rounded *quartz grains mixed with small pieces of iron ore.* This latter is frequently slightly magnetic, and its occurrence in this particular locality is interesting, as Dr. Genth observed the same conditions in his examination of some of the limestone ores from Center county. A sample of the sand from the Calico bank (Rutherford opening) was examined with the following results :

	"Sand."	*"Magnetic portion."*	*"Non-magnetic portion."*
Protoxide of iron,	.171	.502	none.
Sesquioxide of iron,	54.381	83.027	38.571
Sesquioxide of manganese,	.258	.392	.197
Sesquioxide of cobalt,	.040	.030	.050
Alumina,	3.662	4.753	3.157
Lime,	.870	.400	.980
Magnesia,	.317	.407	.304
Sulphuric acid,	.050	.050	.072
Phosphoric acid,	.281	.343	.231
Water,	4.430	2.546	5.288
Silicious matter,	35.540	7.550	51.150
	100.000	100.000	100.000
Metallic iron,	38.200	58.510	27.000
Metallic manganese,	.180	.273	.137
Sulphur,	.020	.020	.029
Phosphorus,	.123	.150	.101
Phosphorus in 100 parts iron,	.322	.256	.374

3. Samples of the ores from different localities were tested for metals of unusual occurrence. *Chromium* was not detected in any specimen. In some of the ores a minute quantity of *zinc* was noticed; but the amount was so exceedingly small that a separate determination of it was not thought necessary. An occasional trace of *baryta* was found, especially in the ores which carried a large percentage of *manganese.* With the exception of the "Garlic" ore not a trace of *iron pyrites* was found in any of the samples, although each one was separately examined for this compound.

In the "Garlic" ore a small quantity of *arsenic* was detected. The ore was supposed to contain a large amount of this element, and it is said that the bank was abandoned on this account.

4. Nearly all the samples from the different ore banks in the Cumberland Valley were selected by myself; and the specimens were so taken as to give as fair a representation of the average character of the ore as was possible under the circumstances. The number of pieces constituting each sample and the part of the bank from which they were taken are given with each analysis, so that a proper estimate can be made of the examination. All the analyses were made of the ore in the *dry state;* and this important point should be borne in mind in determining the value of the ore. As usually mined and shipped it carries quite a large percentage of *hygroscopic water*—sometimes as much as 10 to 12 per cent.—which materially decreases the percentage of metallic iron as compared with the dry ore.

In connection with the iron industries of the Cumberland Valley the following list of the blast furnaces in the district will be in place. It is taken from Mr. James Swank's "Directory to the Iron and Steel Works of the United States," published in 1880.

Franklin County.

Mont Alto furnace, Mont Alto Iron Co., Mont Alto. One

stack, 37½×9½, built in 1808; cold and warm blast; open top; ore, exclusively neutral brown hematite, from the furnace property, which consists of 20,000 acres of land; the pig-iron is used for car-wheels and blooms; annual capacity, 5,600 net tons. Brand, "Mont Alto." I. S. Waterman, president; Geo. B. Wiestling, superintendent. Fuel, charcoal.

Chambersburg furnace, C. Burkhart & Co., Chambersburg. One stack building, 40×9, to be completed in May, 1880; closed top; cold blast; ore, local hematite; specialty, car-wheel pig-iron; annual capacity, 3,000 net tons. Brand, "Chambersburg." Fuel, charcoal.

Richmond furnace, R. T. Ryon & Co., Richmond furnace. One stack, 36×9½, built in 1865 and rebuilt in 1875; open top; fuel, anthracite and coke; ores, from the Richmond mines, two miles from the furnace; annual capacity, 5,500 net tons. Formerly called Mount Pleasant Iron Works.

Carrick furnace, Bland & Spang, Carrick furnace. One stack 37×9, built in 1828; ore, local hematite; product, first class car-wheel pig-iron; annual capacity, 2,800 net tons. Fuel, charcoal.

Franklin furnace, Hunter & Springer, St. Thomas. One stack, 32×7½, built in 1828; cold blast; ore, Cumberland Valley brown hematite; product, car-wheel pig-iron; annual capacity, 1,500 net tons. Brand, "Franklin." Fuel, charcoal.

Cumberland County.

Big Pond furnace, Philadelphia and Reading Coal and Iron Company, Newville. One stack, 33×8½, built in 1836. Fuel, charcoal.

Carlisle Iron Works, C. W. Ahl & Son, Carlisle. Works at Boiling Springs. One stack, 28×8½, built in 1798 and rebuilt in 1815; hot blast; closed top; water power; limestone and mountain ore; specialty, neutral forge pig-iron; annual capacity, 1,600 net tons. Brand, Carlisle.

Pine Grove furnace, South Mountain Mining and Iron Company, Pine Grove furnace. One stack, 45×9⅓, built in 1770; remodeled in 1877; hot blast; bell and hopper top;

ores, hematite procured on the furnace property, which comprises 27,000 acres of land. The furnace has been worked during the winter for the past two years on coke and anthracite coal, the remainder of the year on charcoal. Pig-iron is used for blooms. Annual capacity, 5,000 net tons.

In addition to the above there is a blast furnace now being built at Cleversburg by George Clever & Sons, which is expected to be in blast in a few months.

REPORT OF PROGRESS

IN THE

CHEMICAL LABORATORY AT HARRISBURG,

1879, 1880.

BY ANDREW S. McCREATH.

CHAPTER I.

IRON ORES.

Franklin County.

	(1) *Bower's furnace.*	(2) *Richmond bog bank.*	(3) *Old Mt. Pleasant.*	(4) *Beaver.*
Protoxide of iron, ...	none.	.337	none.	none.
Sesquioxide of iron, . . .	67.142	57.554	67.857	60.571
Sesquioxide of manganese,	.589	trace.	3.352	2.069
Sesquioxide of cobalt, . . .	.390	trace.	.200	.130
Alumina, ...	1.998	2.100	2.887	3.470
Lime, ...	.500	.120	.740	.700
Magnesia, ...	.252	.115	.612	.547
Sulphuric acid, ...	.290	.925	.130	.112
Phosphoric acid, ...	.194	.082	.776	.646
Water and organic matter,	11.754	14.518	12.030	11.572
Silicious matter, ...	17.280	24.530	11.670	19.530
	100.389	100.281	100.254	99.347
Metallic iron, ...	47.000	40.550	47.500	42.400
Metallic manganese, . . .	.410	trace.	2.334	1.441
Sulphur, ...	.116	.370	.052	.045
Phosphorus, ...	.085	.036	.339	.282
Phosphorus in 100 parts iron,	.180	.088	.713	.665

(1) *Bower's furnace ore bank*, on Mrs. Eliza Furray's farm, nine miles southwest of Mercersburg, Warren township. *Brown hematite of VIII.*

Sample consisted of 118 pieces taken from workings 1000′ in length; shafts mostly shallow.

(2) *Richmond furnace bog bank*, about one mile northwest of furnace. *Bog ore* of III.

Sample consisted of 79 pieces taken from ore pit at different places.

(3) *Old Mt. Pleasant bank*, near Richmond furnace. *Lump* and *wash ore.*

Sample consisted of 445 pieces taken from pile of ore prepared for shipment.

(4) *Beaver bank*, about two miles northwest of Richmond furnace. *Lump* and *wash ore.*

Sample consisted of 450 pieces taken from pile of ore prepared for shipment.

Franklin County.

	(5) *Jennings Jones.*	(6) *Old Carrick furnace.*	(6a) *Old Carrick furnace.*	(7) *Railroad bank.*
		Lump ore.	*Wash ore.*	
Sesquioxide of iron,	58.643	64.714	52.000	62.285
Sesquioxide of manganese,	.568	1.582	2.543	.342
Sesquioxide of cobalt,	.030	.170	.280	.280
Alumina,	3.923	2.723	5.709	2.620
Lime,	.760	.450	.620	.560
Magnesia,	.378	.796	.994	.493
Sulphuric acid,	.157	.120	.137	.012
Phosphoric acid,	1.704	.813	.611	3.394
Water and organic matter,	11.885	11.610	10.668	11.132
Silicious matter,	22.000	16.280	26.050	18.500
	100.048	99.258	99.612	99.618
Metallic iron,	41.050	45.300	36.400	43.600
Metallic manganese,	.396	1.102	1.758	.238
Sulphur,	.063	.048	.055	.005
Phosphorus,	.744	.355	.267	1.482*
Phosphorus in 100 parts iron,	1.812	.783	.733	3.399

(5) *Jennings Jones' bank*, four miles north of Richmond furnace.

Sample, selected by Mr. William Burgess, consisted of thirty pieces taken from different parts of mine.

(6) *Old Carrick furnace bank*, one and three fourth miles west of Fannettsburg, Metal township. *Lump ore.*

* Average of two determinations.

Sample consisted of 149 pieces taken from ore pile at furnace.

(*6a*) *Old Carrick furnace bank.* Unwashed *fine ore.*

Sample consisted of 185 pieces taken from ore pile at furnace.

(*7*) *Railroad bank*, about one and three fourth miles west of Fannettsburg, Metal township ; 200 feet north of old Carrick furnace bank.

Sample consisted of 78 pieces taken from ore pile at furnace.

Franklin County.

	(*8*) *Geo. Weinman.*	(*9*) *Leib.*	(*10*) *Stouffer.*	(*11*) *McFarland.*
Protoxide of iron, ...	none.	.176	.192	.128
Sesquioxide of iron, . .	68.857	50.090	58.142	50.928
Sesquioxide of manganese,	1.531	trace.	trace.	trace.
Sesquioxide of cobalt, . .	.390	trace.	trace.	trace.
Alumina, ...	2.573	5.790	3.649	5.520
Lime, ...	.670	.300	.720	.640
Magnesia, ...	.522	.342	.371	.421
Sulphuric acid, ...	.175	.872	.742	.887
Phosphoric acid, ...	.950	.105	·084	.199
Water and organic matter,	11.592	13.896	15.378	14.680
Silicious matter, ...	12.940	27.840	20.030	26.720
	100.200	99.411	99.308	100.123
Metallic iron, ...	48.200	35.200	40.850	35.750
Metallic manganese, . . .	1.066	trace.	trace.	trace.
Sulphur, ...	.070	.349	.297	.355
Phosphorus, ...	.415	.046	.037	.087
Phosphorus in 100 parts iron,	.861	.130	.090	.243

(*8*) *George Weinman's bank*, one and one half miles northwest of Fannettsburg, Metal township. *Surface ore.*

Sample consisted of 156 pieces taken from ore found around opening.

(*9*) *Leib bank*, (J. S. Whitmer & Co.,) two miles east of Mercersburg. *Bog ore* in III.

Sample consisted of 94 pieces taken from ore pile.

(*10*) *Jacob Stouffer's bank*, one mile east of Mercersburg, Montgomery township. *Bog ore* in III.

Sample consisted of 129 pieces taken from ore pit at different places.

(*11*) *R. P. McFarland's bank*, one and one half miles east of Mercersburg, Peters township. *Bog ore* in III.

Sample consisted of 133 pieces taken from ore pile.

Franklin County.

	(12) *Webster.*	(13) *Stinger.*
Sesquioxide of iron,	63.857	56.428
Sesquioxide of manganese,	.290	6.881
Sesquioxide of cobalt,	.510	.390
Alumina,	3.277	2.874
Lime,	.710	.630
Magnesia,	.299	.670
Sulphuric acid,	.135	.105
Phosphoric acid,	1.456	1.388
Water and organic matter,	11.840	12.120
Silicious matter,	17.250	18.810
	99.624	100.296
Metallic iron,	44.700	39.500
Metallic manganese,	.202	4.791
Sulphur,	.054	.042
Phosphorus,	.636	.606
Phosphorus in 100 parts iron,	1.422	1.534

(*12*) *Webster bank*, (Smith, Duncan & Avery,) two miles west, north west of Mercersburg.

Sample consisted of 83 pieces taken from ore pile at bank.

(*13*) *Squire Stinger's old bank*, one mile east of Loudon, Peters township.

Sample consisted of 138 pieces taken from dump of five or six shafts.

Franklin County.

	(14) *Garlic Bank.*
Bisulphide of iron,	.133
Sesquioxide of iron,	75.500
Sesquioxide of manganese,	.113
Sesquioxide of cobalt,	.120
Alumina,	3.363
Lime,	.830
Magnesia,	.338
Sulphuric acid,	.197
Phosphoric acid,	.128
Arsenic acid,	.022
Water and organic matter,	12.908
Silicious matter,	6.890
	100.542
Metallic iron,	52.912
Metallic manganese,	.079
Sulphur,	.150
Phosphorus,	.056
Phosphorus in 100 parts iron,	.105

(*14*) *Garlic bank*, two and one half miles south west of St. Thomas.

Sample consisted of 63 pieces taken from ore found around opening.

Franklin County.

	(*15*) *McCleary.*	(*16*) *Geo. Rock.*	(*17*) *Pass Orchard.*	(*18*) *Douglas.*
Sesquioxide of iron,	75.642	57.785	53.928	62.428
Sesquioxide of manganese,	.579	1.469	.133	.237
Sesquioxide of cobalt,	.180	.130	.190	trace.
Alumina,	2.166	2.985	1.980	1.500
Lime,	.640	.590	.600	.110
Magnesia,	.432	.331	.576	.395
Sulphuric acid,	.065	.072	.065	.087
Phosphoric acid,	.492	.123	1.074	.602
Water and organic matter,	11.928	10.510	8.858	9.392
Silicious matter,	8.500	25.470	32.560	25.570
	100.624	99.465	99 964	100.321
Metallic iron,	52.950	40.450	37.750	43.700
Metallic manganese,	.403	1.023	.093	.165
Sulphur,	.026	.029	.026	.035
Phosphorus,	.215	.054	.469	.263
Phosphorus in 100 parts iron,	.406	.133	1.242	.601

(*15*) *Robert McCleary's bank*, one and one half miles north of Mt. Hope, Quincy township.

Sample consisted of 244 pieces taken from ore lying around bank.

(*16*) *George Rock's bank*, three miles south of Mont Alto, or one mile south east of Quincy.

Sample consisted of 63 pieces taken from ore in place at different parts of the bank. Mine not in operation at date of visit. Bank about 50′ diameter, and from 4′ to 10′ deep.

(*17*) *Pass Orchard bank*, one and one half miles east of Quincy, in Bissecker Gap, Mont Alto estate.

Sample consisted of 165 pieces taken from ore at various pits sunk prior to 1864. Bank not worked.

(*18*) *Wyeth Douglas bank*, one mile north east of Quincy, near Mt. Airy.

Sample, selected by Mr. A. E. Lehman, consisted of several large pieces. No fresh sample was taken from this bank, as upon examination it was thought that the above

analysis, made in 1879, fairly represented the character of the ore.

Franklin County.

	(19) *Mentzer.*	(20) *Smith, Duncan & Avery.*	(21) *Mill bank.*
Sesquioxide of iron,	67.000	52.928	68.928
Sesquioxide of manganese,	.135	.558	.258
Sesquioxide of cobalt,	.160	.090	.240
Alumina,	1.567	3.035	1.927
Lime,	.780	.590	.870
Magnesia,	.371	.450	.230
Sulphuric acid,	.032	.055	.188
Phosphoric acid,	1.012	.950	1.005
Water and organic matter,	10.102	9.665	10.656
Silicious matter,	18.250	31.700	15.200
	99.409	100.021	99.502
Metallic iron,	46.900	37.050	48.250
Metallic manganese,	.094	.389	.180
Sulphur,	.013	.022	.075
Phosphorus,	.442	.415	.439
Phosphorus in 100 parts iron,	.942	1.120	.909

(*19*) *David Mentzer opening*, one and one fourth miles south-west of Altodale, (Funkstown.)

Sample consisted of 91 pieces selected from ore lying around openings.

(*20*) *Smith, Duncan & Avery's bank*, one mile west of Mont Alto. *Lump* and *wash* ore.

Sample consisted of 478 pieces taken from ore pile as prepared for shipment.

Mine worked by open cut. Has probably shipped over 5,000 tons ore.

(*21*) *Mill bank*, (Mont Alto Iron Co.,) about 300 yards west of furnace at Mont Alto.

Sample consisted of 125 pieces taken from ore pile at washer.

This bank is an open excavation, 20 feet deep from surface, 60′×80′. About 1,500 tons of ore mined from it prior to January, 1881.

Franklin County.

	(22)	(23)	(24)	(25)
	Mont Alto Iron Company.			
	Mine No. 3.	*Mine No. 4.*	*Mine No. 5.*	*Mine No. 8.*
Sesquioxide of iron,	60.642	69.214	66.214	77.428
Sesquioxide of manganese,	3.652	2.287	1.825	.817
Sesquioxide of cobalt,	.250	.250	.220	.370
Alumina,	2.695	1.605	2.126	1.243
Lime,	.760	.650	.510	.600
Magnesia,	.681	.486	.490	.324
Sulphuric acid,	.110	.047	.065	.169
Phosphoric acid,	.643	.501	.540	.229
Water and organic matter,	11.065	11.515	10.920	10.607
Silicious matter,	18.870	13.070	16.750	7.870
	99.368	99.625	99.660	99.657
Metallic iron,	42.450	48.450	46.350	54.200
Metallic manganese,	2.543	1.592	1.271	.569
Sulphur,	.044	.019	.026	.067
Phosphorus,	.281	.219	.236	.100
Phosphorus in 100 parts iron,	.661	.452	.509	.184

(*22*) *Mine No. 3*, (Mont Alto Iron Co.,) one fourth mile east of Mont Alto furnace.

Sample consisted of 200 pieces taken from ore in place at different parts of shaft.

Mine both open and underground work. Opened prior to 1864, but idle from 1865 to 1879. Capacity, about 70 tons per day.

(*23*) *Mine No. 4*, (Mont Alto Iron Co.,) three fourths mile east, north-east of Mont Alto furnace.

Sample consisted of 210 pieces taken from pile of ore mined for furnace use at Mont Alto.

This mine is both open and underground work. It has supplied over 100,000 tons of ore to Mont Alto furnace. Deepest point of work below surface, 230 feet; length of mine, 1,800 feet; width of mine, 35 feet.

(*24*) *Mine No. 5*, (Mont Alto Iron Co.,) three fourths mile east, north-east of Mont Alto furnace.

Sample consisted of 75 pieces taken from ore lying around mine.

This mine is worked both open and underground; worked to 50 feet deep from surface. Has furnished about 5,000 tons of ore.

(*25*) *Mine No. 8*, (Mont Alto Iron Co.,) one and one fourth miles north, 38° east, from Mont Alto furnace.

Sample consisted of 197 pieces taken from pile of ore at mine.

Excavation 200′ long, 50′ wide, and 25′ deep.

Franklin County.

	(*26*) *Benj. George.*	(*27*) *John Small.*	(*28*) *Thos. Calliman.*
Sesquioxide of iron,	68.214	75.428	67.857
Sesquioxide of manganese,	1.252	.889	2.266
Sesquioxide of cobalt,	.280	.260	.070
Alumina,	1.182	1.366	2.663
Lime,	.670	.730	.360
Magnesia,	.252	.414	.353
Sulphuric acid,	.100	.070	.047
Phosphoric acid,	.774	.432	.160
Water and organic matter,	11.860	11.780	11.284
Silicious matter,	14.990	8.920	14.510
	99.574	100.289	99.570
Metallic iron,	47.750	52.800	47.500
Metallic manganese,	.872	.619	1.578
Sulphur,	.040	.028	.019
Phosphorus,	.338	.189	.070
Phosphorus in 100 parts iron,	.708	.357	.147

(*26*) *Benjamin George deposit*, one and one quarter miles northeast of Altodale. *Surface ore.*

Sample consisted of 41 pieces selected from surface ore of deposit.

(*27*) *John Small bank*, one and three quarter miles north of Mont Alto furnace; 500 yards east of the Shiery farm.

Sample consisted of 74 pieces taken from ore lying around opening.

Open excavation 35′ long, 25′ wide and 10′ deep. Product about 250 tons.

(*28*) *Thomas Calliman bank*, about one half mile east from Pond No. 1 bank.

Sample consisted of 75 pieces taken from ore lying around openings.

Four pits sunk on this deposit to test the quantity and quality. No large quantity mined.

Franklin County.

	(29) *Jacob Rock.*	(30) *Lucy.*	(31) *Ruth.*	(32) *McNeal.*
Sesquioxide of iron,	67.642	68.642	73.714	66.071
Sesquioxide of manganese,	1.075	2.545	.082	.620
Sesquioxide of cobalt,	.160	trace.	trace.	.120
Alumina,	1.458	3.250	1.650	2.629
Lime,	.700	.740	.830	.630
Magnesia,	.166	.309	.137	.295
Sulphuric acid,	.165	.040	.030	.082
Phosphoric acid,	.451	.252	.229	1.000
Water and organic matter,	11.586	11.692	11.522	12.062
Silicious matter,	16.020	12.100	11.910	15.940
	99.423	99.571	100.104	99.449
Metallic iron,	47.350	48.050	51.600	46.250
Metallic manganese,	.749	1.772	.057	.432
Sulphur,	.066	.016	.012	.033
Phosphorus,	.197	.110	.100	.437
Phosphorus in 100 parts iron,	.416	.228	.193	.944

(*29*) *Jacob Rock's bank*, three miles north of Mont Alto furnace. *Lump* and *wash ore.*

Sample consisted of 288 pieces taken from pile of ore prepared for shipment.

Mine worked by a shaft 105′ deep. Has furnished about 2,000′ tons of ore.

(*30*) *Lucy mine*, (Mont Alto Iron Co.) two and one half miles north from Mont Alto.

Sample consisted of about 50 pieces taken from ore mined from a number of test pits.

Private analysis made for Mont Alto Iron Co., and published by permission of Mr. George B. Wiestling, Supt.

(*31*) *Ruth mine*, (Mont Alto Iron Co.,) one half mile west of the Lucy mine.

Sample consisted of about 50 pieces taken from ore mined from various test pits.

Private analysis published by permission of Mr. George B. Wiestling, superintendent Mont Alto Iron Works.

(*32*) *McNeal bank*, (McCormick & Co.,) about three miles north of Mont Alto.

Sample consisted of 131 pieces taken from ore lying at opening and near it.

Mine not in operation.

Franklin County.

	(33) *Pond No. 2.*	(34) *Pond No. 1.*
Sesquioxide of iron,	69.428	72.214
Sesquioxide of manganese,	3.094	.441
Sesquioxide of cobalt,	.320	trace.
Alumina,	1.627	1.644
Lime,	.800	.940
Magnesia,	.277	.324
Sulphuric acid,	.120	.135
Phosphoric acid,	.135	.362
Water and organic matter,	12.062	12.630
Silicious matter,	11.680	11.520
	99.543	100.210
Metallic iron,	48.600	50.550
Metallic manganese,	2.154	.309
Sulphur,	.048	.054
Phosphorus,	.059	.157-158
Phosphorus in 100 parts iron,	.121	.312

(*33*) *Pond No. 2 bank*, three miles north, northeast of Mont Alto, on Mont Alto estate.

Sample consisted of 218 pieces taken from ore lying around mine.

Mine not in operation at date of visit. Open excavation 110′×90′, and about 10′ deep. Worked prior to 1864, and ore used at Mont Alto furnace. Since 1864 a shaft was sunk and about 2,000 tons of ore mined at depth of 90 feet from surface.

(*34*) *Pond No. 1 bank*, three miles north, northeast of Mont Alto, on Mont Alto estate.

Sample consisted of 175 pieces taken from ore lying around mine. Not in operation at date of visit. 163 pieces selected by Mr. George B. Wiestling since mine has been operated gave: Metallic iron, 48.500; phosphorus, .149; water, 11.935; silicious matter, 13.930; phosphorus in 100 parts iron, .306.

This is an open excavation 300′×150′, and varying in depth from 8′ to 30′.

Quantities of ore were mined here prior to 1864. Laid idle from 1864 until the fall of 1880, when work re-commenced.

	Franklin County.		
	(*35*) *English.*	(*36*) *Lime Kiln.*	(*37*) *Guilford.*
Sesquioxide of iron,	54.785	68.714	75.000
Sesquioxide of manganese,	4.501	3.694	.952
Sesquioxide of cobalt,	.230	.170	.050
Alumina,	4.381	1.605	2.150
Lime,	.280	.830	.480
Magnesia,	.454	.299	.216
Sulphuric acid,	.037	.092	.047
Phosphoric acid,	1.944	.091	.261
Carbonic acid,	.046	none.	none.
Water and organic matter,	11.742	11.200	11.812
Silicious matter,	21.510	12.790	9.110
	99.910	99.485	100.078
Metallic iron,	38.350	48.100	52.500
Metallic manganese,	3.134	2.572	.663
Sulphur,	.015	.036	.019
Phosphorus,	.849	.040	.114
Phosphorus in 100 parts iron,	2.213	.083	.217

(*35*) *English mine*, two miles southeast of Greenwood.

Sample consisted of 138 pieces taken from ore in place at various parts of mine.

Opening about 150′×100′×20′ deep.

(*36*) *Lime Kiln bank*, two and a half miles north of Mont Alto furnace.

Sample consisted of 125 pieces taken from ore lying around opening.

Open and underground. Open work say 25′ diameter and 8′ deep. Underground 40′ deep. Probably about 400 tons taken from mine.

(*37*) *Guilford bank*, two and a half miles south of Greenwood, two and a half miles northeast of Altodale, or two and a half miles north, 25° east of Mont Alto.

Sample consisted of 128 pieces taken from ore lying in and around bank.

Open excavation 75′ long, 30′ wide and 18′ deep. This is surrounded with probably 10 test pits.

Franklin County.

	(38) *Hope.*	(39) *Promise.*	(40) *White Rock.*	(41) *Wiestling.*
Sesquioxide of iron,	61.285	78.000	68.517	78.500
Sesquioxide of manganese,	.775	.483	.685	.465
Sesquioxide of cobalt,	trace.	trace.	trace.	.210
Alumina,	3.143	1.982	2.968	1.754
Lime,	.720	.470	.440	.530
Magnesia,	.306	.248	.349	.227
Sulphuric acid,	.022	.092	.092	.092
Phosphoric acid,	1.062	.238	.250	.199
Water and organic matter,	10.788	12.610	12.190	12.440
Silicious matter,	21.480	5.775	14.320	4.950
	99.581	99.898	99.811	99.367
Metallic iron,	42.900	54.600	47.962	54.950
Metallic manganese,	.540	.336	.477	.324
Sulphur,	.009	.037	.037	.036
Phosphorus,	.464	.104	.109	.087
Phosphorus in 100 parts iron,	1.081	.190	.227	.158

(*38*) *Hope mine*, (Mont Alto Iron Co.,) 200 yards west of the Promise mine; or about three miles north, 20° east of Mont Alto.

Sample consisted of about 50 pieces taken from ore pile mined from pits to test quality.

Private analysis made by me for Mont Alto Iron Co., and published by permission of Mr. Geo. B. Wiestling, Superintendent.

(*39*) *Promise mine*, (Mont Alto Iron Co.,) three miles north, 20° east from Mont Alto.

Sample consisted of about 50 pieces taken from ore mined to test quality.

Worked open and underground 40′ deep.

Private analysis published by permission of Mr. Geo. B. Wiestling, Superintendent of Mont Alto Iron Works.

(*40*) *White Rock mine*, (Mont Alto Iron Co.,) two and one half miles north, 20° east from Mont Alto.

Sample consisted of about 50 pieces taken from several pits or shafts over an area of say 2,000′ square.

Private analysis published by permission of Mr. Geo. B. Wiestling.

(*41*) *Wiestling mine*, three miles north, 25° east of Mont Alto; or one and one half miles south of Greenwood.

Sample consisted of 99 pieces selected from ore taken out of several pits or shafts sunk to test quantity and quality.

Franklin County.

	(42) *Wm. L. Chambers.*	(43) *Ahl's Pipe Ore.*
Sesquioxide of iron,	75.714	78.785
Sesquioxide of manganese,	.081	.235
Sesquioxide of cobalt,	.010	.030
Alumina,	1.968	.550
Lime,	.350	.730
Magnesia,	.216	.281
Sulphuric acid,	.067	.060
Phosphoric acid,	.268	.261
Water and organic matter,	11.760	11.222
Silicious matter,	8.770	7.780
	99.204	99.934
Metallic iron,	53.000	55.150
Metallic manganese,	.057	.165
Sulphur,	.027	.024
Phosphorus,	.117	.114
Phosphorus in 100 parts iron,	.220	.206

(42) *William L. Chambers' opening*, on farm about one mile north of Scotland.

Sample consisted of 75 pieces taken from surface ore near shaft.

(43) *Ahl's bank*, one and one half miles south west of Shippensburg, Southampton township. *Pipe ore.*

Sample consisted of 115 pieces taken from ore lying around and in opening. Bank not in operation.

Franklin County.

	(44) *McHose.*	(45) *Joseph Cressler.*	(46) *Jacob Koser.*
Protoxide of iron,	trace.	trace.	trace.
Sesquioxide of iron,	64.214	55.142	67.142
Sesquioxide of manganese,	1.728	1.002	1.809
Sesquioxide of cobalt,	.050	.070	.090
Alumina,	2.100	1.625	1.471
Lime,	.380	.370	.500
Magnesia,	.396	.138	.183
Sulphuric acid,	.100	.072	.075
Phosphoric acid,	.316	.407	.678
Water and organic matter,	10.812	11.078	12.004
Silicious matter,	19.470	29.970	15.650
	99.566	99.874	99.602

Metallic iron,	44.950	38.600	47.000
Metallic manganese,	1.203	.698	1.260
Sulphur,	.040	.029	.030
Phosphorus,	.138	.178	.296
Phosphorus in 100 parts iron,	.307	.461	.629

(*44*) *McHose bank*, (Old "Neikirk" bank,) three miles west, south-west of Shippensburg. *Wash ore.*

Sample consisted of 227 pieces taken from pile of ore at washer.

(*45*) *Joseph Cressler bank*, about three miles south, south-west of Shippensburg, Southampton township. *Wash ore.*

Sample consisted of 878 pieces taken from pile of ore at washer.

(*46*) *Jacob Koser bank*, about three miles south, south-west of Shippensburg, Southampton township. *Wash ore.*

Sample consisted of 325 pieces taken from pile of ore at washer.

This is the same opening as the Joseph Cressler bank, but ore is mined from a higher level.

Franklin County.

	(*47*) *Old Southampton.*	(*48*) *Ruby or Plaster.*	(*49*) *Gochenauer & Rohrer.*	(*50*) *Means.*
Sesquioxide of iron,	65.071	53.142	62.500	69.214
Sesquioxide of manganese,	1.045	2.358	1.947	2.917
Sesquioxide of cobalt,	.110	.080	.110	.570
Alumina,	3.150	5.352	3.664	1.511
Lime,	.280	.580	.790	.480
Magnesia,	.360	.756	.558	.288
Sulphuric acid,	.032	.072	.070	.032
Phosphoric acid,	1.578	1.406	1.216	.575
Water and organic matter,	11.660	11.468	12.360	11.838
Silicious matter,	16.460	24.250	16.680	13.270
	99.746	99.464	99.895	100.695
Metallic iron,	45.550	37.200	43.750	48.450
Metallic manganese,	.728	1.642	1.356	2.031
Sulphur,	.013	.029	.028	.013
Phosphorus,	.689	.614	.531	.251
Phosphorus in 100 parts iron,	1.512	1.650	1.213	.518

(*47*) *Old Southampton bank*, three miles south of Shippensburg, on old furnace property. Owned by George H. Stewart. Leased to Moses Taylor, New York.

Sample consisted of 213 pieces taken from ore lying around mine. Bank not in operation.

(*48*) *Ruby or Plaster bank*, three and one half miles south of Shippensburg, near old Southampton furnace.

Sample consisted of 275 pieces taken from ore lying around mine. Bank not in operation.

(*49*) *Gochenauer & Rohrer bank*, three miles south of Shippensburg, on Clever farm, near old Southampton furnace.

Sample consisted of 160 pieces taken from ore lying around mine. Bank not in operation at date of visit.

(*50*) *Means bank*, about three miles south east of Shippensburg, near county line.

Sample consisted of 121 pieces taken from ore dump. Bank not in operation.

Cumberland County.

	(*51*) *John H. Cressler.*	(*52*) *Geo. Clever.*	(*53*) *No. 1 Clever.*	(*53a*) *"No. 1 Clever."*
Sesquioxide of iron,	69.785	64.214	52.571	68.428
Sesquioxide of manganese,	.351	1.417	8.054	8.599
Sesquioxide of cobalt,	.420	.040	.230	.280
Alumina,	1.971	2.350	1.777	1.953
Lime,	.620	.580	1.090	.620
Magnesia,	.410	.504	.374	.129
Sulphuric acid,	.067	.062	.047	.037
Phosphoric acid,	.334	1.225	4.092	1.518
Water and organic matter,	11.246	12.604	13.134	13.050
Silicious matter,	14.780	16.860	18.640	5.420
	99.984	99.856	100.009	100.034
Metallic iron,	48.850	44.950	36.800	47.900
Metallic manganese,	.245	.987	5.620	5.987
Sulphur,	.027	.025	.019	.015
Phosphorus,	.146	.535	1.787*	.663
Phosphorus in 100 parts iron,	.298	1.190	4.856	1.384

(*51*) *John H. Cressler's bank*, (old "Clippinger,") two and one half miles south east of Shippensburg. *Wash ore.*

Sample consisted of 710 pieces taken from pile of ore at washer.

(*52*) *George Clever bank*, at Cleversburg. Worked by Wisegarver & Peacock. *Lump* and *wash* ore.

*A duplicate determination of the phosphorus, by Mr. John M. Stinson, gave 1.778 per cent.

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Sample consisted of 315 pieces taken from ore pile at washer.

(*53*) *No. 1 Clever Mammoth bank*, (now Ahl's,) on Clever farm, one and one fourth miles south east of Cleversburg, Southampton township.

Sample consisted of 144 pieces taken from ore lying around and in mine at different places. Bank not in operation.

(*53a*) "*No. 1 Clever Mammoth bank*," one and one fourth miles south east of Cleversburg.

This sample was brought to the Laboratory by Mr. Daniel V. Ahl, and was said to have been selected by himself and miner from this bank.

Cumberland County.

	(*54*)	(*55*)	(*56*)
		Calico bank.	
	Bridge's.	*Coover opening.*	*Rutherford opening.*
Protoxide of iron,	none.	trace.	trace.
Sesquioxide of iron,	75.642	67.928	71.857
Sesquioxide of manganese,	.382	.123	.133
Sesquioxide of cobalt,	trace.	.060	.060
Alumina,	1.250	2.205	2.356
Lime,	.380	.510	.460
Magnesia,	.331	.403	.457
Sulphuric acid,	.097	.115	.102
Phosphoric acid,	.300	.197	.197
Water and organic matter,	12.166	10.158	10.164
Silicious matter,	9.500	17.720	13.440
	100.048	99.429	99.226
Metallic iron,	52.950	47.550	50.300
Metallic manganese,	.266	.094	.094
Sulphur,	.039	.046	.041
Phosphorus,	.131	.086	.086
Phosphorus in 100 parts iron,	.247	.180	.170

(*54*) *John Bridge's opening*, two miles south-east of Shippensburg.

Sample consisted of 108 pieces selected from ore taken out of trial shaft; also from ore lying near same.

(*55*) *Calico bank—Coover opening*, (McCormick & Co.,) three miles north-east of Shippensburg. *Wash ore.*

Sample consisted of 524 pieces taken from ore pile at washer; also from pile at railroad wharf.

(*56*) *Calico bank—Rutherford opening*, (McCormick & Co.,) three miles north-east of Shippensburg. *Wash ore.*

Sample consisted of 351 pieces taken from ore lying around mine.

Cumberland County.

	(*57*) *Chestnut.*	(*58*) *Geo. H. Clever.*	(*59*) *Big Pond.*
Sesquioxide of iron,	58.000	72.314	62.857
Sesquioxide of manganese,	1.212	3.032	1.831
Sesquioxide of cobalt,	.070	.270	.200
Alumina,	2.250	2.100	1.853
Lime,	.630	.540	.660
Magnesia,	.306	.302	.270
Sulphuric acid,	.057	.067	.075
Phosphoric acid,	.705	1.266	.728
Water and organic matter,	10.778	13.013	10.896
Silicious matter,	25.350	7.750	20.520
	99.358	100.654	99.890
Metallic iron,	40.600	50.620	44.000
Metallic manganese,	.844	2.111	1.275
Sulphur,	.023	.027	.030
Phosphorus,	.308	.553	.318
Phosphorus in 100 parts iron,	.758	1.090	.722

(*57*) *Chestnut bank*, (McCormick & Co. and Lawton & Stewart,) four miles east of Shippensburg. *Wash ore.*

Sample consisted of 953 pieces taken from ore pile at washer. Mine not in operation.

(*58*) *George H. Clever bank*, one and a half miles east of Cleversburg, Southampton township. *Lump* and *wash* ore.

Sample consisted of 356 pieces taken from pile of ore prepared for shipment.

(*59*) *Big Pond bank*, (Philadelphia and Reading Coal and Iron Co.,) about five miles east of Shippensburg, or about one half mile west of Big Pond furnace.

Sample consisted of 175 pieces taken from ore found in place and lying around the three most westerly openings. Bank not in operation.

Cumberland County.

	(*60*) *Old Peach Orchard.*	(*61*) *Peffer.*
Sesquioxide of iron,	64.214	77.428
Sesquioxide of manganese,	2.431	.123
Sesquioxide of cobalt,	.110	.140
Alumina,	2.230	1.502

Lime,	.580	.740
Magnesia,	.342	.443
Sulphuric acid,	.020	.112
Phosphoric acid,	1.708	.471
Water and organic matter,	11.756	12.266
Silicious matter,	15.950	6.560
	99.341	99.785
Metallic iron,	44.950	54.200
Metallic manganese,	1.693	.086
Sulphur,	.008	.045
Phosphorus,	.746	.206
Phosphorus in 100 parts iron,	1.659	.308

(*60*) *Old Peach Orchard bank*, (Grove & Co.,) about three miles south west of Centerville, or about three miles south east of Jacksonville.

Sample consisted of 121 pieces taken from ore in place, also from wash ore lying around mine. Bank not in operation.

(*61*) *Peffer bank*, two miles west of Papertown.

Sample consisted of 152 pieces taken from ore lying around mine. Bank not in operation.

Cumberland County.

	(*62*)	(*63*)	(*64*)	(*65*)
	South Mountain Mining & Iron Co.			
	Wild Cat.	*Pine Grove.*	*Laurel No. 2.*	*Laurel No. 1.*
Sesquioxide of iron,	68.857	60.212	58.000	54.428
Sesquioxide of manganese,	.527	3.891	4.408	10.379
Sesquioxide of cobalt,	.240	.130	.340	.520
Alumina,	1.684	1.559	4.296	1.565
Lime,	.610	.950	.500	.890
Magnesia,	.328	.771	.627	.418
Sulphuric acid,	.062	.070	.085	.056
Phosphoric acid,	3.119	.629	1.124	.387
Water and organic matter,	11.287	11.176	11.622	11.373
Silicious matter,	12.800	20.900	19.260	20.220
	99.514	100.288	100.262	100.236
Metallic iron,	48.200	42.150	40.600	38.100
Metallic manganese,	.367	2.709	3.069	7.226
Sulphur,	.025	.028	.034	.022
Phosphorus,	1.365	.275	.491	.169
Phosphorus in 100 parts iron,	2.831	.652	1.209	.443

(*62*) *Wild Cat openings*, (South Mountain Mining and Iron Co.,) about two and one half miles south west of Pine Grove.

Sample consisted of 60 pieces selected from ore taken out of several openings or shafts.

(*63*) *Pine Grove ore bank*, (South Mountain Mining and Iron Co.,) at Pine Grove furnace.

Sample consisted of 154 pieces taken from ore in place at different parts of bank. Ore mined for use at Pine Grove furnace.

(*64*) *Laurel No. 2 bank*, (South Mountain Mining and Iron Co.,) about one mile south of Laurel forge.

Sample consisted of 160 pieces taken from ore pile at bank. Bank not in operation at date of visit.

(*65*) *Laurel No. 1 bank*, (South Mountain Mining and Iron Co.,) at Laurel forge.

Sample consisted of 112 pieces taken from ore lying in and around mine. Bank not in operation. Samples selected independently by Mr. Daniel King, superintendent Pine Grove furnace, and analyzed by him corroborated the above results.

Cumberland County.

	(*66*) *Henry Clay No. 3.*	(*67*) *Henry Clay No. 2.*	(*68*) *Henry Clay*	(*68a*) *Henry Clay No. 1.*
Sequioxide of iron,	59.071	52.643	51.214	71.785
Sesquioxide of manganese,	1.799	2.173	3.227	.103
Sesquioxide of cobalt,	.240	.280	.210	.070
Alumina,	2.365	2.324	1.885	3.630
Lime,	.590	.460	.590	.260
Magnesia,	.504	.468	.468	.194
Sulphuric acid,	.060	.060	.080	.017
Phosphoric acid,	1.525	.733	.421	1.175
Water and organic matter,	11.332	10.420	9.678	11.644
Silicious matter	22.000	29.970	31.890	10.650
	99.486	99.531	99.663	99.528
Metallic iron,	41.350	36.850	35.850	50.250
Metallic manganese,	1.253	1.513	2.247	.072
Sulphur,	.024	.024	.032	.007
Phosphorus,	.666	.320	.184	.513
Phosphorus in 100 parts iron,	1.610	.868	.513	1.020

(*66*) *Henry Clay No. 3 bank*, (Seyfert & McManus) two and a half miles north east of Laurel.

Sample consisted of 70 pieces taken from ore lying around mine. Bank not in operation.

(67) *Henry Clay No. 2 bank*, (Lanigan & Wynkoop) about two and three fourth miles north east of Laurel. Henry M. Watts & Son, lessees.

Sample consisted of 101 pieces taken from ore in place and also from that lying around mine. Bank not in operation at date of sampling.

(68) *Henry Clay No. 1 bank*, (Guiterman & Robinson) three miles north east of Laurel. Mount Holly Ore Bank Company, lessees.

Sample consisted of 90 pieces taken from ore lying around mine. Bank not in operation at date of sampling.

(68a) *Henry Clay No. 1 bank*, (Guiterman & Robinson) three miles north east of Laurel. Mount Holly Ore Bank Company, lessees.

Samples of *lump ore* selected by Mr. Ethelbert Watts since bank has been operated.

Cumberland County.

	(69) *Diven tract.*	(70) *Koontz & Myers.*
Sesquioxide of iron,	64.500	49.285
Sesquioxide of manganese,	.507	.650
Sesquioxide of cobalt,	.230	.040
Alumina,	3.868	5.867
Lime,	.630	.600
Magnesia,	.630	.972
Sulphuric acid,	.035	.102
Phosphoric acid,	1.772	.538
Water and organic matter,	12.127	10.385
Silicious matter,	14.970	30.840
	99.269	99.279
Metallic iron,	45.150	34.500
Metallic manganese,	.353	.453
Sulphur,	.014	.041
Phosphorus,	.774	.235
Phosphorus in 100 parts iron,	1.714	.681

(69) *Diven tract openings*, (McCormick & Co.) three and one half miles north east of Laurel.

Sample consisted of 106 pieces taken from ore found at 11 different pits or trial shafts.

(70) *Koontz & Myers' bank*, about three and one half miles north east of Laurel. *Wash ore.*

Sample consisted of 174 pieces selected from ore pile.

Ore from which sample was taken was prepared by the so-called "Dry Washer," so that analysis practically represents the ore unwashed.

Cumberland County.

	(71) *Grove Wash ore.*	(71a) *Grove Lump ore.*	(72) *J. C. Lehman, No. 2.*
Sesquioxide of iron,	51.571	67.000	62.785
Sesquioxide of manganese,	2.266	1.841	.178
Sesquioxide of cobalt,	.260	.170	.070
Alumina,	2.964	3.910	3.546
Lime,	.580	.210	.380
Magnesia,	.385	.183	.321
Sulphuric acid,	.037	.007	.115
Phosphoric acid,	2.095	1.852	.199
Water and organic matter,	11.204	10.870	12.874
Silicious matter,	28.620	13.370	18.860
	99.982	99.413	99.328
Metallic iron,	36.100	46.900	43.950
Metallic manganese,	1.578	1.282	.124
Sulphur,	.015	.003	.046
Phosphorus,	.915	.809	.087
Phosphorus in 100 parts of iron,	2.534	1.725	.197

(*71*) *Grove bank*, about one half mile south of Hunter's Run Station, South Mountain railroad. *Wash ore.* Bank adjoins the Lehman No. 2 tract.

Sample consisted of 410 pieces taken from ore pile at washer.

(*71a*) *Grove bank*, about one half mile south of Hunter's Run Station. *Lump ore.*

Sample of the lump ore selected by Dr. E. A. Grove at my request.

(*72*) *J. C. Lehman No. 2 bank*, (Eisenhower & Gill,) about three quarters of a mile south of Hunter's Run Station, South Mountain railroad. *Wash ore.*

Sample consisted of 192 pieces taken from pile of ore prepared for shipment.

This bank has been quite recently leased by Messrs. Henry M. Watts & Son.

Cumberland County.

	(73) *Mount Holly (Medlar.)*	(73a) *Mount Holly (Medlar.)*
Sesquioxide of iron,	54.643	69.285
Sesquioxide of manganese,	3.921	1.044
Sesquioxide of cobalt,	.360	.230
Alumina,	2.010	1.141
Lime,	.150	.670
Magnesia,	.304	.145
Sulphuric acid,	.012	.015
Phosphoric acid,	3.144	3.708
Water and organic matter,	11.312	12.298
Silicious matter,	23.550	11.270
	99.406	99.806
Metallic iron,	38.250	48.500
Metallic manganese,	2.730	.727
Sulphur,	.005	.006
Phosphorus,	1.373	1.619
Phosphorus in 100 parts iron,	3.589	3.338

(73) *Mount Holly (Medlar) bank*, (Mount Holly Ore Bank Company,) about one mile south west of Mount Holly. *Two thirds lump and one third wash ore.*

Sample consisted of 230 pieces taken from ore in place at different parts of bank; wash ore from ore pile.

(73a) *Mount Holly (Medlar) bank*, (Mount Holly Ore Bank Company,) about one mile south west of Mount Holly.

Sample represents the dark brown cellular lump ore from north east end of bank, analysed separately.

Cumberland County.

	(74) *Mullen.*	(75) *Strickler.*	(76) *Pepper.*
Sesquioxide of iron,	64.142	61.357	64.428
Sesquioxide of manganese,	2.638	.133	.330
Sesquioxide of cobalt,	.180	.260	.290
Alumina,	1.130	2.555	1.749
Lime,	2.010	.530	.590
Magnesia,	.418	.562	.299
Sulphuric acid,	.056	.067	.050
Phosphoric acid,	.898	3.188	.403
Water and organic matter,	12.035	11.668	11.200
Silicious matter,	16.180	18.960	21.020
	99.687	99.280	100.359
Metallic iron,	44.900	42.950	45.100
Metallic manganese,	1.837	.093	.230
Sulphur,	.022	.027	.020
Phosphorus,	.392	1.392	.176
Phosphorus in 100 parts iron,	.873	3.240	.390

(*74*) *Mullen bank*, about one mile west of Mount Holly. *One fourth lump and three fourths wash ore.* Mr. Daniel King, lessee.

Sample consisted of 640 pieces taken from pile of ore prepared for shipment.

(*75*) *Strickler bank*, one mile east of Mount Holly, or three miles south-west of Boiling Springs.

Sample consisted of 130 pieces taken from ore in place, also from ore lying around mine. Bank not in operation.

(*76*) *Pepper bank*, ("Old mine,") two miles south west of Boiling Springs.

Sample consisted of 123 pieces taken from ore lying around mine. Bank not in operation.

Cumberland County.

	(*77*) *Ege bank.*	(*77a*) *Ege bank.*	(*78*) *Beltzhoover bank.*	(*78a*) *Beltzhoover bank.*
	Lump ore.	*Wash ore.*	*Lump ore.*	*Wash ore.*
Sesquioxide of iron,	49.071	45.928	58.428	52.785
Sesquioxide of manganese,	6.519	4.469	3.725	1.934
Sesquioxide of cobalt,	.180	.170	.130	.120
Alumina,	2.368	4.677	2.861	4.980
Lime,	.500	.500	.500	.610
Magnesia,	.342	.637	.504	.753
Sulphuric acid,	.055	.055	.075	.072
Phosphoric acid,	2.471	2.425	2.081	1.695
Water and organic matter,	11.674	11.814	12.186	12.240
Silicious matter,	26.370	28.800	19.290	24.360
	99.550	99.475	99.780	99.549
Metallic iron,	34.350	32.150	40.900	36.950
Metallic manganese,	4.539	3.112	2.594	1.347
Sulphur,	.022	.022	.030	.029
Phosphorus,	1.079	1.059	.909	.740
Phosphorus in 100 parts iron,	3.141	3.293	2.222	2.003

(*77*) *Ege bank*, (Philadelphia and Reading Coal and Iron Co.,) one mile south east of Boiling Springs. *Lump ore.*

Sample consisted of 177 pieces taken from ore pile at mine.

(*77a*) *Ege bank*, (Philadelphia and Reading Coal and Iron Co.,) one mile south east of Boiling Springs. *Wash ore.*

Sample consisted of 345 pieces taken from ore pile at mine.

(*78*) *Beltzhoover bank*, (Philadelphia and Reading Coal and Iron Co.,) two miles south east of Boiling Springs. *Lump ore.*

Sample consisted of 195 pieces taken from ore pile at mine.

(*78a*) *Beltzhoover bank*, (Philadelphia and Reading Coal and Iron Co.,) two miles south east of Boiling Springs. *Wash ore.*

Sample consisted of 320 pieces taken from ore pile at mine.

Cumberland County.

	(*79*) *Leidig & Hoffer.*
Sesquioxide of iron,	69.571
Sesquioxide of manganese,	.352
Sesquioxide of cobalt,	.040
Alumina,	1.560
Lime,	.350
Magnesia,	.248
Sulphuric acid,	.062
Phosphoric acid,	.870
Water and organic matter,	11.796
Silicious matter,	15.090
	99.939
Metallic iron,	48.700
Metallic manganese,	.245
Sulphur,	.025
Phosphorus,	.380
Phosphorus in 100 parts iron,	.780

(*79*) *Leidig & Hoffer bank*, about three and one half miles south east of Boiling Springs.

Sample consisted of 186 pieces selected from ore lying around mine. Bank not in operation.

York County.

	(*80*) *Wolf.*	(*81*) *Heck.*	(*82*) *Coover & Wolf.*
Sesquioxide of iron,	58.500	63.571	65.000
Sesquioxide of manganese,	.713	.443	1.873
Sesquioxide of cobalt,	.140	.090	.190
Alumina,	3.872	2.138	2 050
Lime,	.700	.350	.140
Magnesia,	.641	.288	.396
Sulphuric acid,	.082	.062	.057
Phosphoric acid,	1.628	.661	.783
Water and organic matter,	11.926	11.132	12.200
Silicious matter,	21.100	20.850	16.570
	99.302	99.585	99.259

Metallic iron,	40.950	44.500	45.500
Metallic manganese,	.497	.309	1.304
Sulphur,	.032	.025	.023
Phosphorus,	.711	.289	.342
Phosphorus in 100 parts iron,	1.736	.649	.751

(*80*) *Wolf bank*, three miles west, south west of Dillsburg.

Sample consisted of 273 pieces taken from ore in place at different parts of mine; also from ore pile at washer.

Bank not in operation.

(*81*) *Heck bank*, (old "Knaub" bank,) three miles west of Dillsburg. *Lump* and *wash* ore.

Sample consisted of 580 pieces taken from ore in place at different parts of mine. Wash ore taken from ore pile at washer.

(*82*) *Coover & Wolf bank*, two and one half miles west of Dillsburg. *Lump ore.*

Sample consisted of 156 pieces taken from ore pile at mine.

York County.

	(*83*) *C. H. Bender*	(*84*) *McCormick & Co.*
Sesquioxide of iron,	64.357	62 857
Sesquioxide of manganese,	.589	1.811
Sesquioxide of cobalt,	.170	.210
Alumina,	3.123	3.955
Lime,	.510	.630
Magnesia,	.342	.299
Sulphuric acid,	.042	.060
Phosphoric acid,	1.170	2.178
Water and organic matter,	12.068	12.596
Silicious matter,	17.240	14.820
	99.611	99.416
Metallic iron,	45.050	44.000
Metallic manganese,	.410	1.261
Sulphur,	.017	.024
Phosphorus,	.511	.951
Phosphorus in 100 parts iron,	1.134	2.161

(*83*) *C. H. Bender bank*, two miles south west of Dillsburg.

Sample consisted of 206 pieces taken from ore in place; also from that lying around mine. Bank not in operation.

(*84*) *McCormick & Co.'s bank*, (Attick's) two miles south west of Dillsburg.

Sample consisted of 235 pieces taken from ore in place; also from that lying around opening. Bank not in operation.

These two banks adjoin each other.

Dillsburg Magnetites.

York County.

	(*85*) *Shelly & Hoffer.*	(*86*) *Bell.*	(*87*) *McClure.*
Bisulphide of iron,	.062	2.604	1.605
Protoxide of iron	6.942	15.171	13.821
Sesquioxide of iron,	45.923	42.193	47.859
Protoxide of manganese,	.155	.139	.036
Protoxide of cobalt,	.330	.080	.040
Oxide of copper,	.003	none.	trace.
Alumina,	2.560	3.102	3.775
Lime,	10.290	9.200	5.604
Magnesia,	5.200	5.333	4.129
Sulphuric acid,	.099	.900	1.105
Phosphoric acid,	.052	.043	.107
Carbonic acid,	none.	.428	none.
Water,	3.106	1.050	1.140
Silica,	25.370	19.640	20.330
	100.092	99.883	99.551
Metallic iron,	37.575	42.550	45.000
Metallic manganese,	.120	.108	.028
Sulphur,	.072	1.750	1.297
Phosphorus,	.023	.019	.047
Phosphorus in 100 parts iron,	.061	.044	.104

(*85*) *Shelly & Hoffer mine*, one and a half miles south east of Dillsburg.

Sample consisted of about 15 lbs. of the ore selected from different parts of ore pile.

(*86*) *Bell mine*, two miles south east of Dillsburg.

Sample consisted of about 15 lbs. of the ore selected from different parts of ore pile *Pyrites considerably decomposed.*

(*87*) *McClure mine*, (King & Jauss) two miles east of Dillsburg.

Sample consisted of about 25 lbs. of the ore taken at 30 feet from outcrop.

A sample selected by Mr. King at 110 feet from outcrop gave: Metallic iron, 43.000; sulphur, 1.230; phosphorus, .028; silica, 17.780; phosphorus in 100 parts iron, .065. This second sample carried considerable lime as carbonate.

York County.

	(*88*) *Longnecker old mine.*	(*89*) *Longneeker new mine.*	(*90*) *Underwood.*
Bisulphide of iron,	.819	.013	3.047
Protoxide of iron,	11.957	15.300	15.685
Sesquioxide of iron,	40.954	44.420	37.968
Protoxide of manganese,	.102	.102	.093
Protoxide of cobalt,	.176	.100	.116
Oxide of copper,	.014	trace.	.014
Alumina,	4.898	5.006	4.150
Lime,	9.600	8.610	9.970
Magnesia,	6.462	5.657	6.614
Sulphuric acid,	.532	.020	.765
Phosphoric acid,	.037	.066	.068
Carbonic acid,	.220	.418	.418
Water,	1.985	1.066	1.400
Silica,	21.830	18.770	19.030
	99.586	99.548	99.338
Metallic iron,	38.350	43.000	40.200
Metallic manganese,	.079	.079	.072
Sulphur,	.650	.015	1.931
Phosphorus,	.016	.029	.030
Phosphorus in 100 parts iron,	.041	.067	.074

(*88*) *Longnecker old mine*, one mile east of Dillsburg, on Underwood property.

Sample consisted of about 15 pounds of the ore selected from different parts of ore pile.

(*89*) *Longnecker new mine*, one mile east of Dillsburg, and 300 feet north east of old mine.

Sample consisted of about 15 pounds of the ore selected from different parts of ore pile at mine.

(*90*) *Underwood mine*, one mile east of Dillsburg.

Sample consisted of about 15 pounds of the ore selected from different parts of ore pile. Pyrites considerably decomposed.

York County.

	(91) *Mumper.*	(92) *Logan.*
Bisulphide of iron,	none.	4.093
Protoxide of iron,	9.643	18.643
Sesquioxide of iron,	43.714	42.100
Protoxide of manganese,	.129	.186
Sulphide of cobalt,	trace.	.766
Sulphide of copper,	trace.	.098
Alumina,	3.650	2.417
Lime,	11.020	6.132
Magnesia,	5.030	6.738
Potash and soda,	——	.350
Sulphuric acid,	.017	.119
Phosphoric acid,	.055	.052
Carbonic acid,	.846	1.760
Water,	2.490	1.080
Silica,	22.900	15.120
	99.494	99.654
Metallic iron,	38.100	45.880
Metallic manganese,	.100	.144
Sulphur,	.007	2.680
Phosphorus,	.024	.023
Phosphorus in 100 parts iron,	.063	.050

(91) *Mumper mine*, (McCormick & Co.,) one mile north east of Dillsburg.

Sample about 25 pounds taken from ore in drift by Mr. Thomas Parfet.

(92) *Logan mine*, (McCormick & Co.,) one mile north east of Dillsburg.

Sample about 50 pounds selected by Prof. Frazer.

York County.

	(93) *Landis or Fuller mine.*	(93a)
	Lower level.	*Upper level.*
Bisulphide of iron,	.450	.013
Protoxide of iron,	18.385	17.614
Sesquioxide of iron,	43.414	49.487
Protoxide of manganese,	.352	.157
Protoxide of cobalt,	.326	.050
Oxide of copper,	trace.	trace.
Alumina,	2.774	2.098
Lime,	7.563	5.820
Magnesia,	5.001	4.969
Potash and soda,	.054	——
Sulphuric acid,	.011	.007

Phosphoric acid,	.052	.041
Carbonic acid,	1.640	.354
Water,	2.320	2.430
Silica,	17.860	16.640
	100.202	99.680
Metallic iron,	44.900	48.350
Metallic manganese,	.272	.122
Sulphur,	.244	.007
Phosphorus,	.023	.018
Phosphorus in 100 parts iron,	.051	.037

(*93*) *Landis or Fuller mine*, on Yellow Breeches creek, three miles north east of Dillsburg. *Lower level.* J. C. Fuller, Joseph Fuller and Daniel King, lessees.

Sample consisted of about 50 pounds of ore selected by Prof. Frazer. Ore taken at depth of 60 feet from surface.

(*93a*) *Landis or Fuller mine*, on Yellow Breeches creek, three miles north east of Dillsburg. *Upper level.*

Sample consisted of about 15 pounds of ore taken from ore pile at different places. Ore taken from workings at depth of 40 feet from surface.

Perry County.

The iron ores of Perry county occur chiefly in formations No. V and No. VIII. *The Clinton fossil ores of No. V* have already been described in Report MM, pp. 234 and 235, and in greater detail in Report F, so that no further reference to them is here necessary. The *fossil ores of VIII* may be the same as the Mansfield ores of Tioga county, but their identification with them has not yet been sufficiently established. The specimens examined from Perry county are generally very shaly and their contents of metallic iron low. Most of the brown hematite ores of Perry county are mined from the *Marcellus ore bed* which underlies the black slates of No. VIII, and overlies the green calcareous shales. Although the thickness of the ore deposit is extremely variable yet a large quantity of ore has been mined at different localities from this horizon. The quality is usually quite good, the ore being almost uniformly low in its contents of

phosphorus. A small quantity of ore has also been mined in the *Corniferous shales;* but the quality of the ore is usually inferior, although occasional deposits are met with which are quite rich in iron.

Perry County.
Brown Hematites.

	(94) *Loy.*	(95) *Long.*
Sesquioxide of iron,	71.071	56.928
Sesquioxide of manganese,	.694	.313
Alumina,	2.907	4.477*
Lime,	.330	.510
Magnesia,	.277	.464
Sulphuric acid,	.090	.335
Phosphoric acid,	.242	.263
Water and organic matter,	12.770	12.100
Silicious matter,	11.620	24 610
	100.001	100.000
Metallic iron,	49.750	39.850
Metallic manganese,	.483	.218
Sulphur,	.036	.134
Phosphorus,	.106	.115
Phosphorus in 100 parts iron,	.213	.288

(94) *Mr. Loy's land*, two miles northeast of Landisburg, on the southeast side of Loy's Hill. Surface ore. *Marcellus brown hematite.*

Cellular; brittle; dark-brown and yellowish-brown.

(95) *D. J. Long's land*, three miles southwest of New Bloomfield, on northwest side of Mahonoy Ridge. *Marcellus brown hematite.*

Generally cellular and brittle; light-brown and yellowish-brown.

Perry County.

	(96) *Mahonoy Ridge.*
Iron,	42.650
Sulphur,	.046
Phosphorus,	.142
Silicious matter,	22.580
Phosphorus in 100 parts iron,	.332

(96) *On north west side of Mahonoy Ridge*, three miles south west of New Bloomfield. *Marcellus brown hematite.*

Rather hard and brittle; compact, somewhat shaly; carries considerable adhering red clay. Dark brown generally. (J. M. S.)

*By difference.

Perry County—Carbonate Ore.

	(97) D. J. Long.
Bisulphide of iron,	1.117
Protoxide of iron,	21.471
Sesquioxide of iron,	19.571
Sesquioxide of manganese,	1.448
Sesquioxide of cobalt,	trace.
Alumina,	1.352
Lime,	2.230
Magnesia,	.872
Sulphuric acid,	.107
Phosphoric acid,	.091
Carbonic acid,	14.871
Water.	4.430
Silicious matter,	32.440
	100.000
Metallic iron,	30.920
Metallic manganese,	1.008
Sulphur,	.639
Phosphorus,	.040
Phosphorus in 100 parts iron,	.129

(97) *D. J. Long's land*, three miles south west of New Bloomfield on north west side of Mahonoy Ridge. *Marcellus carbonate ore.*

More or less oxidized throughout; comparatively soft, with sandy appearance. Color, dark brown.

Perry County.

	(98) MacNamara.	(99) Barnitz.
Sesquioxide of iron,	56.857	67.428
Sesquioxide of manganese,	.192	.705
Alumina, (by difference,)	4.470	3.475
Lime,	.540	.510
Magnesia,	.583	.335
Sulphuric acid,	.067	.105
Phosphoric acid,	1.291	.432
Water and organic matter,	10.130	13.740
Silicious matter,	25.870	13.270
	100.000	100.000
Metallic iron,	39.800	47.250
Metallic manganese,	.134	.490
Sulphur,	.027	.042
Phosphorus,	.564	.189
Phosphorus in 100 parts iron,	1.417	.400

(98) *Mr. MacNamara's land*, two miles south east from New Bloomfield. *Corniferous brown hematite.*

Generally compact and brittle; dark brown and reddish brown.

(*99*) *Barnitz farm*, near New Bloomfield. *Marcellus brown hematite.*

Bombshell ore; fine grained; brittle; dark brown. Carries considerable carbonaceous matter.

Perry County.

	(*100*)	(*101*)	(*102*)
	"*Washer Ore Pit.*"		
Sesquioxide of iron,	50.285	61.143	62.000
Sesquioxide of manganese,	.051	.072	.072
Alumina,	5.101*	2.937	4.191
Lime,	1.070	.650	.600
Magnesia,	.342	.288	.324
Sulphuric acid,	trace.	.107	.135
Phosphoric acid,	.146	.176	.279
Water and organic matter,	7.465	9.980	9.925
Silicious matter,	35.540	24.640	22.570
	100 000	99.993	100.096
Metallic iron,	35.200	42.800	43.400
Metallic manganese,	.035	.050	.050
Sulphur,	trace.	.043	.054
Phosphorus,	.064	.077	.122
Phosphorus in 100 parts iron,	.181	.179	.281

(*100*) "*Washer ore pit*," about two miles south west from Newport, on Limestone Ridge. From the clay in the ore pit near the surface. *Corniferous brown hematite.*

Generally compact and fine grained; appearance shaly; color, reddish brown.

(*101*) "*Washer ore pit*," about two miles south west from Newport, on crest of Limestone Ridge, at Newport and Duncannon road. In synclinal of Oriskany sandstone, in the upper part of the Corniferous shale. *Corniferous brown hematite.*

Compact and fine grained; dark brown and reddish brown; some of the ore has a shaly appearance.

(*102*) "*Washer ore pit*," about two miles south west from Newport, on crest of Limestone Ridge. *Corniferous brown hematite.*

Appearance sandy; very brittle; dark brown and yellowish brown.

* By difference.

Perry County.

	(*103*) *Limestone Ridge Mining Company.*	(*104*) *Limestone Ridge Mining Company.*
Sesquioxide of iron,	59.500	54.214
Sesquioxide of manganese,	.120	.083
Alumina,	5.072*	2.044
Lime,	.720	.600
Magnesia,	.324	.327
Sulphuric acid,	.100	.047
Phosphoric acid,	.469	2.072
Water and organic matter,	10.495	8.065
Silicious matter,	23.200	31.870
	100.000	99.322
Metallic iron,	41.650	37.950
Metallic manganese,	.083	.058
Sulphuric,	.040	.019
Phosphorus,	.205	.905
Phosphorus in 100 parts iron,	.492	2.384

(*103*) *Limestone Ridge Mining Co.*, two miles from Newport, on Limestone Ridge; east end of long ore pit, east of "Washer ore pit." *Corniferous brown hematite.*

Bombshell ore, with considerable clay in bomb; very brittle; color, dark brown.

(*104*) *Limestone Ridge Mining Co.* From first opening north east of east ore pit; on crest of Limestone Ridge, south of Newport; on the road leading off from the Newport and Bailey Station road. In the synclinal of the Oriskany sandstone. A few hundred tons mined by the Limestone Ridge Mining Co. *Corniferous brown hematite.*

Generally compact and fine-grained; somewhat shaly; dark brown.

Perry County.

	(*105*) *Long.*	(*106*) *Schuyler.*	(*107*) *Smith.*	(*108*) *Rinesmith.*
Sesquioxide of iron,	38.714	72.857	33.643	60.928
Sesquioxide of manganese,	.517	.485	.020	.100
Alumina,	5.974	.777	4.023*	3.746*
Lime,	.570	.690	.960	.660
Magnesia,	.292	.187	.767	.216
Sulphuric acid,	.027	.077	trace.	.155
Phosphoric acid,	2.116	.346	.192	.185
Water and organic matter,	9.594	12.655	7.745	9.390
Silicious matter,	41.640	11.860	52.650	24.620
	99.444	99.934	100.000	100.000

* By difference.

Metallic iron,	27.100	51.000	23.550	42.650
Metallic manganese,	.360	.337	.014	.070
Sulphur,	.011	.031	trace.	.062
Phosphorus,	.924	.151	.084	.081
Phosphorus in 100 parts iron,	3.405	.296	.356	.189

(*105*) *John C. Long*, Liverpool township, three miles from Susquehanna river.

(*106*) *Mr. Schuyler's land*, on north west side of Perry Furnace ridge, three miles south west of Perry furnace. *Marcellus brown hematite.*

Cellular; brittle; dark brown.

(*107*) *Henry Smith's land*, in Sandy Hollow, two miles north west from Gibson's mill. Red ore mined for making paint.

In the Corniferous shale.

Generally compact and fine-grained; shaly; reddish brown.

(*108*) *One mile south west of Rinesmith's farm*, in Sandy Hollow, north east of Gibson rock. *Brown hematite of VII.*

Hard and compact; some portions of sample shaly; iridescent; carries some adhering yellow clay; various shades of brown. (J. M. S.)

Fossil ores.

Perry County.

	(*109*) *Seidel.*
Metallic iron,	25.500
Sulphur,	.014
Phosphorus,	.267
Silicious matter,	45.220
Phosphorus in 100 parts iron,	1.047

(*109*) *J. B. Seidel's lands*, one mile south west of Marysville, on north west side of Little mountain. On top of Hamilton SS. *Montebello fossil ore.*

Rather soft; structure shaly; oolitic; dark brown. (J. M. S.)

Perry County.

	(*110*) *Lickel.*	(*111*) *Cook.*
Sesquioxide of iron,	47.285	44.857
Sesquioxide of manganese,	trace.	.062

Alumina,	7.989*	5.650
Lime,	.300	.640
Magnesia,	.810	.313
Sulphuric acid,	.079	.077
Phosphoric acid,	.572	1.083
Water and organic matter,	6.955	9.995
Silicious matter,	36.010	37.160
	100.000	99.837
Metallic iron,	33.100	31.400
Metallic manganese,	trace.	.043
Sulphur,	.031	.031
Phosphorus,	.250	.473
Phosphorus in 100 parts iron,	.755	1.506

(*110*) *From an old working on Lewis Lickel's land*, on south east side of Dick's hill, three miles south west from Juniata river. *Montebello fossil ore; from top bed of ore.*

Rather soft; dark brown and reddish brown. Somewhat coated with white clay. (J. M. S.)

(*111*) *Philip Cook's land*, Polecat valley, in Mahonoy valley; on the south west side of Mahonoy ridge; two and three quarter miles south west from the Juniata river. *Montebello fossil ore; top bed.* 6″ to 8″ thick.

Shaly; comparatively soft and brittle; dark brown.

Perry County.

	(*112*) *Cumbler.*
Metallic iron,	35.775
Sulphur,	.010
Phosphorus,	.731
Silicious matter,	31.740
Phosphorus in 100 parts iron,	2.043

(*112*) *Cumbler property*, Miller township; one half mile north west from the Cook property; on left side of ravine. Dr. Harry Stites, Newport. *Montebello fossil ore.*

Rather coarse grained; argillaceous; reddish brown.

Perry County.

	(*113*)	(*114*)	(*115*)	(*116*)
		George Peterman.		
Sesquioxide of iron,	41.714	33.428	44.143	40.714
Sesquioxide of manganese,	.110	.220	.352	.042
Alumina,	9.037	12.143	9.381	3.764

* By difference.

Lime,	.560	.610	.570	.230
Magnesia,	.428	.536	.407	.583
Sulphuric acid,	.025	.025	.037	.029
Phosphoric acid,	1.399	.719	1.376	.478
Water and organic matter,	10.745	7.385	9.685	4.485
Silicious matter,	35.620	44.690	34.070	48.980
	99.638	99.756	100.021	99.305
Metallic iron,	29.200	23.400	30.900	28.250
Metallic manganese,	.079	.158	.253	.030
Sulphur,	.010	.010	.015	.011
Phosphorus,	.611	.314	.601	.209
Phosphorus in 100 parts iron,	2.092	1.341	1.945	.739

(*113*) *George Peterman's land;* Duncannon Iron Co., lessees. Polecat valley, in Mahonoy valley, on the south east side of Mahonoy ridge, three miles south west of Juniata river. *Montebello ore. Top division of ore;* upper bed 8″ to 10″ thick.

Soft; crumbling; shaly; dark brown; structure somewhat laminated.

(*114*) *George Peterman's land;* Duncannon Iron Co., lessees. Polecat valley, in Mahonoy valley, on the south east side of Mahonoy ridge, three miles south west of Juniata river. *Montebello ore. Middle division of ore=the bottom division of the upper ore bed.* 8′ to 10″ thick.

Soft; crumbling; very shaly; reddish brown.

(*115*) *George Peterman's land;* Duncannon Iron Co., lessees. Polecat valley, in Mahonoy valley, on the south east side of Mahonoy ridge, three miles south west of Juniata river. *Montebello ore. Top bed of ore.* Soft ore, 18″ thick.

Comparatively soft; shaly; reddish brown.

(*116*) *George Peterman's land;* Duncannon Iron Co., lessees. Polecat valley, in Mahonoy valley, on the south east side of Mahonoy ridge, three miles south west of Juniata river. *Montebello ore. Bottom bench of ore=lower of the two ore beds*, 8″ thick.

Rather coarse-grained and sandy; full of fossil casts; somewhat porous; reddish brown.

Perry County.

	(117)	(118)	(119)
	B. G. Mush & Co.		*Michael's Ridge.*
Sesquioxide of iron,	78.571	73.714	55.285
Sesquioxide of manganese,	.021	.021	.051
Alumina,	4.927	5.702	7.553
Lime,	.510	.390	.650
Magnesia,	.213	.209	.400
Sulphuric acid,	.042	.050	.030
Phosphoric acid,	1.502	1.784	.382
Water and organic matter,	6.015	9.075	5.690
Silicious matter,	8.170	8.870	30.490
	99.971	99.815	100.531
Metallic iron,	55.000	51.600	38.700
Metallic manganese,	.015	.015	.036
Sulphur,	.016	.020	.012
Phosphorus,	.656	.779	.167
Phosphorus in 100 parts iron,	1.192	1.509	.431

(*117*) *B. G. Mush & Co.*, south east side of Tuscarora mountain, one fourth mile north from Millerstown, on the north east side of the Juniata river. *Sand vein fossil ore.* Sample represents the quality of the greater part of the ore bed, 10″ to 12″ thick.

Rather coarse grained and friable; reddish brown.

(*118*) *B. G. Mush & Co.*, south east side of Tuscarora mountain, one fourth mile north from Millerstown, on the north east side of the Juniata river. Sample represents the character of ore 3″ to 4″ thick in bed.

Hard and tough; rather fine grained; dark brown and reddish brown; small masses of shale in specimens.

(*119*) *On south east side of Tuscarora mountain* (Michael's Ridge); one fourth mile north west of Millerstown, and a few hundred rods north east of Juniata river. *Fossil ore of V*, 8″ thick; from ore sandstone—7′ from top.

Compact; specimen consists of a mixture of hard and soft ore; reddish brown. (J. M. S.)

Perry County.

Red hematite of IX.

	(120) *Basom.*
Sesquioxide of iron,	86.000
Sesquioxide of manganese,	.072
Alumina, (by difference,)	1.848

Lime,	.750
Magnesia,	.403
Sulphuric acid,	.040
Phosphoric acid,	.082
Water and organic matter,	.975
Silicious matter,	9.830
	100.000
Metallic iron,	60.200
Metallic manganese,	.050
Sulphur,	.016
Phosphorus,	.036
Phosphorus in 100 parts iron,	.059

(*120*) *Christian Basom's land*, in Wildcat Valley, two miles northeast of Juniata river. Where opened it is 4″ thick.

Red specular iron ore; comparatively soft and micaceous; color, generally deep red.

Juniata County.

	Brown hematite of VIII. (*121*) *Clark.*	*Fossil ore of V.* (*122*) *Venormer.*
Sesquioxide of iron,	73.393	62.714
Sesquioxide of manganese,	1.205	.455
Alumina,	1.540	4.696
Lime,	.580	.310
Magnesia,	.130	.497
Sulphuric acid,	.675	.010
Phosphoric acid,	.261	.430
Water organic matter,	14.150	4.600
Silicious matter,	8.160	26.040
	100.094	99.752
Metallic iron,	51.375	43.900
Metallic manganese,	.839	.317
Sulphur,	.270	.004
Phosphorus,	.114	.188
Phosphorus in 100 parts iron,	.221	.428

(*121*) *Mr. Clark's land*, three miles south west of New Waterford, on the Limestone Ridge north west of Tuscarora mountain. *Marcellus brown hematite.*

Brittle; cellular; dark-brown and yellowish-brown.

(*122*) On *Joshua Venormer's land*, 15 miles east from Mifflintown, 6 miles north of Thompsontown, in Fayette township. Fossil ore, 22″ thick. Sample taken by Jacob Smith.

Rather soft; somewhat oolitic; carries a small amount of specular iron ore; light-brown and reddish-brown.

(J. M. S.)

Mifflin County.

Fossil ore of V.

	(*123*) *J. J. Dull.*
Sesquioxide of iron,	71.571
Sesquioxide of manganese,	.682
Alumina,	4.493
Lime,	.560
Magnesia,	.342
Sulphuric acid,	.035
Phosphoric acid,	.614
Water and organic matter,	4.753
Silicious matter,	16.950
	100.000
Metallic iron,	50.100
Metallic manganese,	.475
Sulphur,	.014
Phosphorus,	.268
Phosphorus in 100 parts iron,	.534

(*123*) *J. J. Dull's ore opening* in Oliver township, about one and one fourth miles north of Dunkard church, on old mountain road, Jack's mountain. *Fossil ore of V.* Sample selected by Mr. Dull.

Coarse-grained; oolitic; reddish-brown. A portion of the specimen was in fine powder and rather argillaceous.

Mifflin County—Carbonate ore.

	(*124*) *Robt. McCormick.*
Metallic iron,	28.325
Sulphur,	.306
Phosphorus,	.036
Silicious matter,	30.170
Phosphorus in 100 parts iron,	.127

(*124*) *Robt. McCormick's* ore opening in Oliver township, four miles south west from McVeytown. *Carbonate ore of VIII (?).*

Soft; fine grained; argillaceous; pearl gray color.

Huntingdon County.

Brown hematites.

	(*125*) *Shade.*	(*126*) *Taylor.*
Sesquioxide of iron,	53.857	66.571
Sesquioxide of manganese,	.275	.510
Alumina, (by difference,)	2.861	1.606
Lime,	.690	.710
Magnesia,	.313	.285
Sulphuric acid,	.190	.075
Phosphoric acid,	.114	.323
Water and organic matter,	13.200	13.580
Silicious matter,	28.500	16.340
	100.000	100.000
Metallic iron,	37 700	46.600
Metallic manganese,	.191	.355
Sulphur,	.076	.030
Phosphorus,	.050	.141
Phosphorus in 100 parts iron,	.132	.302

(*125*) *Property of Dr. J. A. Shade*, two miles south west from Shade Gap, Shade valley. Outcrop of *Marcellus ore bed.*

Brittle ; cellular ; full of seams of ochreous iron ore ; color generally light-brown. Ore carries a large amount of carbonaceous matter.

(*126*) *Property of Isaac Taylor*, three miles south west from Shade Gap. *Marcellus ore bed.*

Cellular ; brittle ; light and dark brown ; ore carries considerable carbonaceous matter.

Huntingdon County.

	(*127*) *Addleman.*
Sesquioxide of iron,	82.928
Sesquioxide of manganese,	.020
Alumina, (by difference,)	1.175
Lime,	.550
Magnesia,	.119
Sulphuric acid,	.067
Phosphoric acid,	.061
Water and organic matter,	11.510
Silicious matter,	3.570
	100.000
Metallic iron,	58.050
Metallic manganese,	.014
Sulphur,	.027
Phosphorus,	.027
Phosphorus in 100 parts iron,	.046

(*127*) *From property of Mr. Wm. B. Addleman*, near Warriors Mark. Sample sent to Laboratory by Rev. W. V. Ganoe. *Brown hematite of II.*

Very hard and generally compact; botryoidal; with fibrous brown oxide of iron; dark brown. (J. M. S.)

Huntingdon County—Fossil ores.

	(*128*) *Dull & Bradley.*	(*129*) *Bradley.*
Sesquioxide of iron,	71.571	42.928
Sesquioxide of manganese,	trace.	.403
Alumina, (by difference,)	4.512	1.363
Lime,	1.630	24.380
Magnesia,	.619	1.895
Sulphuric acid,	trace.	trace.
Phosphoric acid,	.998	1.021
Carbonic acid,	none.	19.710
Water,	4.940	1.900
Silicious matter,	15.730	6.400
	100.000	100.000
Metallic iron,	50.100	30.050
Metallic manganese,	trace.	.281
Sulphur,	trace.	trace.
Phosphorus,	.436	.446
Phosphorus in 100 parts iron,	.870	1.484

(*128*) *On property of Dull & Bradley*, three quarters of a mile south of Mapleton. White & Rex. *Fossil ore of V. Soft fossil.*

Comparatively soft; shows small scales of specular iron ore; color, various shades of brown. (J. M. S.)

(*129*) *On property of Dull & Bradley*, three quarters of a mile south of Mapleton. White & Rex. *Fossil ore of V. Hard fossil.*

Compact; brittle; dark brown and reddish brown. (J. M. S.)

Huntingdon County.

	(*130*) *McCarthy.*
Sesquioxide of iron,	22.571
Sesquioxide of manganese,	.713
Alumina,	2.610
Lime,	17.250
Magnesia,	1.675
Sulphuric acid,	.072
Phosphoric acid,	.742
Carbonic acid,	11.980

Water,	4.018
Silicious matter,	38.510
	100.141
Metallic iron,	15.800
Metallic manganese,	.497
Sulphur,	.029
Phosphorus,	.324
Phosphorus in 100 parts iron,	2.050

(*130*) *A. R. McCarthy, M. D.*, Mount Union. Ore from Clear Ridge, (Smith's Valley side,) Union township, about three and one half miles from Mapleton depot, P. R. R. *Fossil ore of VIII* (?).

Dark reddish brown; sandy looking.

Fulton County.

Brown Hematites.

	(*131*) *Trout.*	(*132*) *Awl.*
Sesquioxide of iron,	47.500	66.428
Sesquioxide of manganese,	6.227	.132
Sesquioxide of cobalt,	.310	——
Alumina.	3.120	2.024*
Lime,	3.210	.720
Magnesia,	.562	.270
Sulphuric acid,	.040	.170
Phosphoric acid,	2.553	.121
Water and organic matter,	10.850	11.315
Silicious matter,	25.040	18.820
	99.412	100.000
Metallic iron,	33.250	46.500
Metallic manganese,	4.323	.092
Sulphur,	.016	.068
Phosphorus,	1.115	.053
Phosphorus in 100 parts iron,	3.353	.113

(*131*) *From land of Wm. Trout*, one mile south east from Fort Littleton. *Brown hematite of VI*, (?) scattered on the top of the limestone ridge.

Cellular; full of seams of oxide of manganese; generally dark brown.

(*132*) *From the land of P. Awl & Bro.*, on the north west side of Sydney Knob, three fourths mile north west of Burnt Cabins. *Marcellus brown hematite.*

Generally fine-grained and compact; hard and brittle; color, various shades of dark brown and reddish brown.

* By difference.

Bedford County.

Fossil Ores.

	(133) James Sill. Upper.	(134) James Sill. Lower.
Metallic iron,	38.625	25.825
Phosphorus,	.299	.301
Carbonate of lime,	27.578	48.114
Carbonate of magnesia,	1.210	1.059
Silicious matter,	10.720	10.120
Phosphorus in 100 parts iron,	.774	1.166

(*133*) *James Sill*, Bedford, Napier twp. *Fossil ore of V; upper layer.*

Coarse-grained, with considerable micaceous iron ore; shows small particles of calcareous matter. Color, reddish brown.

(*134*) *James Sill*, Bedford, Napier twp. *Fossil ore of V; lower layer.*

Coarse-grained; considerable calcareous matter throughout; reddish brown and grey.

Centre County.

Brown Hematite.

	(135) Addleman.
Sesquioxide of iron,	67.642
Sesquioxide of manganese,	.195
Sesquioxide of cobalt,	.020
Alumina,	4.068
Lime,	1.470
Magnesia,	.151
Sulphuric acid,	1.780
Phosphoric acid,	.100
Water and organic matter,	19.344
Silicious matter,	5.230
	100.000
Metallic iron,	47.350
Metallic manganese,	.136
Sulphur,	.712
Phosphorus,	.044
Phosphorus in 100 parts iron,	.092

(*135*) *Wm. B. Addleman's property*, Taylor twp., near Hannah furnace, above Fowler's station, on Bald Eagle Ridge.

Cellular; soft; ochreous; light brown and reddish brown. (J. M. S.)

Clinton County.

Brown Hematites.

	(136) Salona Ore Bank.	(137) Salona Ore Bank.
	Lump.	*Wash.*
Sesquioxide of iron,	77.071	74.785
Sesquioxide of manganese,	.030	.030
Sesquioxide of cobalt,	trace.	trace.
Alumina,	.593	2.053
Lime,	.630	.640
Magnesia,	.468	.508
Sulphuric acid,	.087	.097
Phosphoric acid,	.036	.132
Water and organic matter,	12.650	11.978
Silicious matter,	8.380	9.780
	99.945	100.003
Metallic iron,	53.950	52.350
Metallic manganese,	.021	.021
Sulphur,	.035	.039
Phosphorus,	.016	.058
Phosphorus in 100 parts iron,	.029	.110

(*136*) *Salona ore bank*, Nittany valley, Porter township. *Lump* (*Kidney*) *ore.*

(*137*) *Salona ore bank*, Nittany valley, Porter township. *Wash ore.*

Limonite, botryoidal; dark brown; small masses of quartz throughout specimens.

Lycoming County.

Fossil Ores.

	(138) Young's Ore Bank.	(139) Young's Ore Bank.	(140) Young's Ore Bank.
	Upper.	*Middle.*	*Lower.*
Sesquioxide of iron,	30 000	42.857	43.928
Sesquioxide of manganese,	.145	.248	.300
Alumina,	5.051	5.975	4.568
Lime,	1.100	1.720	1.300
Magnesia,	1.116	1.037	1.000
Sulphuric acid,	.015	.022	.005
Phosphoric acid,	.439	.868	.694
Carbonic acid,	1.277	1.289	1.075
Water,	2.773	3.971	3.925
Silicious matter,	58.120	41.980	42.570
	100.036	99.967	99.365

Metallic iron,	21.000	30.000	30.750
Metallic manganese,	.101	.173	.209
Sulphur,	.006	.009	.002
Phosphorus,	.192	.379	.303
Phosphorus in 100 parts iron,	.914	1.263	.985

(*138*) *J. Young's ore bank*, on the south side of the Susquehanna river, near Antes Fort, opposite Jersey Shore, and about two miles south from it. *Fossil ore of V. Upper layer.*

Compact; fine-grained; sandy; with lenticular masses of slate; reddish brown.

(*139*) *J. Young's ore bank*, on the south side of the Susquehanna river, near Antes Fort, opposite Jersey Shore, and about two miles south from it. *Fossil ore of V. Middle layer.*

Compact; fine-grained; sandy; with numerous shot-like phosphatic pebbles.

(*140*) *J. Young's ore bank*, on the south side of the Susquehanna river, near Antes Fort, opposite Jersey Shore, and about two miles south from it. *Fossil ore of V. Lower layer.*

Same general appearance as No. (139.)

Lycoming County.

	(*141*) *McGowan.*	(*142*) *Quiggleville.*	(*143*) *Hayes*	(*144*) *Furnace Run.*
Sesquioxide of iron,	40.714	46.643	49.857	42.857
Sesquioxide of manganese,	.103	.300	.248	.186
Alumina,	5.269	5.476	3.774	4.690
Lime,	1.620	1.760	6.270	1.450
Magnesia,	.828	1.030	1.693	.881
Sulphuric acid,	trace.	trace.	trace.	trace.
Phosphoric acid,	.907	1.101	1.759	.863
Carbonic acid,	none.	none.	2.590	none.
Water,	3.710	4.310	4.060	3.705
Silicious matter,	56.630	39.220	29.130	44.830
	99.781	99.840	99.381	99.462
Metallic iron,	28.500	32.650	34.900	30.000
Metallic manganese,	.072	.209	.173	.130
Sulphur,	trace.	trace.	trace.	trace.
Phosphorus,	.396	.481	.768	.377
Phosphorus in 100 parts iron,	1.389	1.473	2.200	1.256

(*141*) *McGowan mine*, Piatt township, two miles north east from Jersey Shore; Stewart's run. *Fossil ore of VIII.*

Generally compact; highly fossiliferous; with some phosphatic pebbles; color, reddish brown.

(*142*) *Quiggleville mine*, at Quiggleville, one mile north west from Perryville, Lycoming township; just south of Mr. Stiber's house. *Chemung fossil ore.*

Rather compact and fine-grained; fossiliferous; with some phosphatic pebbles; color, reddish brown.

(*143*) *Hayes mine*, on Lycoming creek, Hepburn township; one third mile north of Cogan Station, N. C. R.R. *Chemung fossil ore.*

Rather coarse-grained; highly fossiliferous; carries numerous phosphatic pebbles. Color, reddish brown and reddish grey.

(*144*) *Furnace run mines*, on the north side of Furnace run, close to the south line of Watson township, and near the old Safe Harbor furnace; six miles north west of Jersey Shore. *Chemung fossil ores.*

Rather fine-grained; fossiliferous; shaly; reddish brown.

Lycoming county—Carbonate ore.

	(*145*) *Cartersville.*
Metallic iron,	31.000
Metallic manganese,	.288
Sulphur,	trace.
Phosphorus,	.075
Alumina,	1.004
Lime,	1.250
Magnesia,	1.549
Silicious matter,	28.770
Phosphorus in 100 parts iron,	.241

(*145*) *Cartersville furnace*, McIntyre township; one mile north from McIntyre station, N. C. R.R. *Carbonate ore of XI.*

Exceedingly hard and tough; fine-grained; crust hematitic; fresh fracture glistens with small scales of mica. Color, reddish grey.

Sullivan county.

Carbonate ores.

	(*146*) *Ganoga*	(*147*) *Lake.*
Metallic iron,	20.575	15.950
Sulphur,	.007	.012
Phosphorus,	.386	.076
Silicious matter,	46.650	62.890
Phosphorus in 100 parts iron,	1.876	.476

(*146*) *Near Ganoga lake. Vein under the Conglomerate.*

Carbonate ore; coarse grained; hard and tough; sandy; greenish grey.

(*147*) *At Ganoga lake. Vein over yellow ochre.*

Carbonate ore; somewhat oxidized; very coarse grained; sandy; greenish grey and reddish brown.

Jefferson County.

Brown hematites.

	(*148*) *Perry Kahle.*	(*149*) *Butterfield.*
Sesquioxide of iron,	62.500	34.714
Sesquioxide of manganese,	.620	3.537
Alumina,	2.172	1.312
Lime,	.650	.580
Magnesia,	.396	.216
Sulphuric acid,	.072	.082
Phosphoric acid,	.778	.364
Water and organic matter,	10.684	6.944
Silicious matter,	22.340	52.850
	100.212	100.599
Metallic iron,	43.750	24.300
Metallic manganese,	.432	2.464
Sulphur,	.029	.033
Phosphorus,	.340	.159
Phosphorus in 100 parts iron,	.777	.654

(*148*) *Perry Kahle*, two miles west of Sigel, Eldred township.

Limonite, dark brown to yellowish brown; structure more or less laminated; considerably coated with a pinkish clay.

(*149*) *Owen Butterfield*, Barnet township.

Dark brown to yellowish brown; structure laminated; inside of specimen contains numerous lenticular masses of soft sandrock.

Jefferson county—Carbonate ore.

	(*150*) *Magiffin.*
Bisulphide of iron,	.052
Protoxide of iron,	37.607
Sesquioxide of iron,	3.214
Protoxide of manganese,	1.776
Protoxide of cobalt,	trace.
Alumina,	1.634
Lime,	6.600
Magnesia,	2.594
Sulphuric acid,	trace.
Phosphoric acid,	.572
Carbonic acid,	30.791
Water,	1.350
Silicious matter,	13.810
	100.000
Metallic iron,	31.524
Metallic manganese,	1.376
Sulphur,	.028
Phosphorus,	.250
Phosphorus in 100 parts iron,	.793

(*150*) *J. S. Magiffin*, two and a half miles south west of Brookville, Rose township. *Buhrstone iron ore.*

Exceedingly hard and tough plate ore; full of small drusy cavities; fracture irregular, slightly conchoidal; color, brownish grey.

Armstrong County.

The principal iron ores of Armstrong county are found at the horizon of the Ferriferous limestone. These ores have long been mined and have been the principal source of supply for the blast furnaces of the county. The ore occurs both as a brown hematite and as a carbonate. The former is usually very rich in iron, averaging, when properly mined, nearly 50 per cent. metallic iron; and as the percentage of phosphorus is not excessive a very good quality of mill iron can be made from its use. The average thickness of the ore is only about eight inches; but as it occurs directly in contact with the Ferriferous limestone—which is the flux used in the furnace—it can be easily and profitably mined. The carbonate ore is always roasted before being smelted; and at some of the furnaces it is customary to roast both varie-

ties of the ore. For this purpose the slack coal is generally used. Besides adding by its ash a considerable percentage of silicious matter to the roasted ore it not unfrequently carries quite a large percentage of phosphorus* which materially affects the quality of the pig iron produced. This question has already been discussed by Mr. Wm. G. Platt in his report on Armstrong county, volume H⁵, pp. lvii to lxiii, so that no further reference to it is here necessary.

Armstrong County.

Brown hematites.

	(151)	(152)	(153)	(154)
	Stewardson furnace.			*Campbell & Barrett.*
Protoxide of iron,	none.	none.	none.	none.
Sesquioxide of iron,	73.143	70.714	73.928	68.928
Sesquioxide of manganese,	1.386	2.421	1.344	2.048
Sesquioxide of cobalt,	trace.	.010	.020	trace.
Alumina,	1.691	1.491	1.532	1.358
Lime,	4.920	7.630	1.610	8.670
Magnesia,	.800	.547	.501	.576
Sulphuric acid,	.010	.010	trace.	.012
Phosphoric acid,	.636	.765	.740	.584
Carbonic acid,	3 980	5.230	none.	6.980
Water,	8.800	7.465	12.615	6.600
Silicious matter,	4.800	3.860	8.060	4.370
	100.166	100.143	100.350	100.126
Metallic iron,	51.200	49.500	51.750	48.250
Metallic manganese,	.965	1.686	.936	1.426
Sulphur,	.004	.004	trace.	.005
Phosphorus,	.278	.334	.323	.255
Phosphorus in 100 parts iron,	.542	.674	.624	.528

(*151*) *At Stewardson furnace*, one mile east from mouth of Mahoning creek, in Madison township. F. B. & A. Laughlin. *Ferriferous limestone ore.*

Very compact and fine grained; exceedingly brittle, with rough irregular fracture. Irregularly seamed with calcite. Numerous pits filled with white pulverulent silicate of alumina. Reddish brown.

(*152*) *At Stewardson furnace*, one mile east from mouth of Mahoning creek, in Madison township. F. B. & A. Laughlin. *Ferriferous limestone ore.* "*Red ore.*"

*See table of "Phosphorus in Coals and Cokes," page 78.

Very compact and fine grained ; exceedingly brittle, with rough irregular fracture. Irregularly seamed with calcite. Generally reddish brown.

(*153*) *At Stewardson furnace*, one mile east from mouth of Mahoning creek, in Madison township. F. B. & A. Laughlin. *Ferriferous limestone ore.* "*Brown ore.*"

Cellular ; also fine grained ; dark brown and yellowish brown.

(*154*) *Campbell & Barrett*, one mile north west of Centreville, Madison township. *Ferriferous limestone ore.*

Exceedingly compact and fine grained ; hard and tough, with rough, irregular fracture ; somewhat conchoidal ; numerous pits of pulverulent silicate of alumina. Reddish brown.

Armstrong County.

	(*155*) *Stewardson.*
Protoxide of iron,	none.
Sesquioxide of iron,	65.928
Sesquioxide of manganese,	1.563
Sesquioxide of cobalt,	.020
Alumina,	2.688
Lime,	7.710
Magnesia,	.901
Sulphuric acid,	.580
Phosphoric acid,	1.074
Carbonic acid, Water, } absorbed,	5.365
Silicious matter,	14.520
	100.349
Metallic iron,	46.150
Metallic manganese,	1.088
Sulphur,	.232
Phosphorus,	.469
Phosphorus in 100 parts,	1.016

(*155*) *Stewardson furnace*, one mile east from mouth of Mahoning creek, in Madison township. F. B. & A. Laughlin. *Ferriferous limestone ore.* "*Mixed ores roasted.*"

Armstrong County.

	(156) *Stewardson furnace, "Ore screenings."*
Metallic iron,	24.600
Metallic manganese,	1.232
Sulphur,	.528
Phosphorus,	.544
Alumina,	14.328
Lime,	6.030
Magnesia,	.691
Silica,	31.800
Phosphorus in 100 parts iron,	2.211

(*156*) *Stewardson furnace*, one mile east of mouth of Mahoning creek, in Madison township. F. B. & A. Laughlin. *Ore screenings.*

Armstrong County—Carbonate Iron Ores.

	(157) *Colwell.*	(158) *Brady's Bend.*	(159) *Stewardson.*
Bisulphide of iron,	.062	.090	.187
Protoxide of iron,	41.464	38.378	42.428
Sesquioxide of iron,	10.310	2.646	2.233
Protoxide of manganese,	2.353	1.153	.799
Protoxide of cobalt,	trace.	trace.	.010
Alumina,	1.919	1.223	.916
Lime,	4.690	10.840	7.150
Magnesia,	2.054	2.666	1.881
Sulphuric acid,	trace.	trace.	.030
Phosphoric acid,	.623	.480	.334
Carbonic acid,	31.450	32.074	32.622
Water,	1.315	1.910	1.950
Silicious matter,	3.760	8.540	9.460
	100.000	100.000	100.000
Metallic iron,	39.500	31.750	34.650
Metallic manganese,	1.823	.893	.619
Sulphur,	.029	.042	.112
Phosphorus,	.272	.224	.146
Phosphorus in 100 parts iron,	.688	.705	.421

(*157*) *J. A. Colwell*, one half mile north west of Mahoning furnace, in Madison township. *Ferriferous limestone ore.*

Rather coarse-grained and porous; more or less oxidized throughout; mottled with calcite; color, generally reddish grey.

(*158*) *Brady's Bend Iron Company*, in Brady's Bend

township, one mile south west of Brady's Bend. Ore from Phillip's hill. *Ferriferous limestone ore.*

Crust hematitic; exceedingly hard and tough; rather fine-grained; fracture irregular, rough; color, reddish grey.

(*159*) *Stewardson furnace*, one mile east from mouth of Mahoning creek, in Madison township. F. B. & A. Laughlin. *Blue Carbonate ore.*

Rather hard and tough; coarse-grained; bluish grey.

Armstrong County.

	(*160*) *Brown, Neale & Orr.*
Iron as carbonate,	27.267
Iron as bisulphide,	8.733
Total metallic iron,	36.000
Sulphur,	9.981
Phosphorus,	.350
Silicious matter,	12.520
Phosphorus in 100 parts iron,	.972

(*160*) *Brown, Neale & Orr*, near Allegheny furnace, two and one half miles north west from Kittanning, in Valley township. *Carbonate ore under Kittanning Lower coal.*

Exceedingly hard and tough; fine-grained; dark bluish grey. Large quantities of iron pyrites in minute crystals disseminated throughout the mass. (J. M. S.)

Clarion County.

Carbonate Ores.

	(*161*) *Sligo.*	(*162*) *Fox.*	(*163*) *Hindman.*
Bisulphide of iron,	.109	·491	.009
Protoxide of iron,	44.357	48.535	38.571
Sesquioxide of iron,	2.857	1.101	2.142
Protoxide of manganese,	2.101	1.282	1.756
Protoxide of cobalt,	trace.	trace.	trace.
Alumina,	.743	.528	1.027
Lime,	6.380	5.650	6.750
Magnesia,	2.248	2.396	1.992
Sulphuric acid,	trace.	trace.	trace.
Phosphoric acid,	.643	.277	2.333
Carbonic acid,	33.333	36.109	29.403
Water,	1.789	.711	2.137
Silicious matter,	5.440	2.920	13.880
	100.000	100.000	100.000

Metallic iron,	36.550	38.750	31.500
Metallic manganese,	1.628	.994	1.361
Sulphur,	.058	.262	.005
Phosphorus,	.281	.121	1.019
Phosphorus in 100 parts iron,	.768	.312	3.234

(*161*) *Sligo Furnace bank*, Piney township. *Ferriferous limestone ore.*

Specimen more or less oxidized; calc-spar in thin plates; somewhat cellular; bluish grey and reddish grey.

(*162*) *Fox farm*, Piney township. *Ferriferous limestone ore. Plate ore.*

Very fine grained; full of little pits partially filled with calc-spar; rather hard and tough; bluish grey.

(*163*) *Hindman's quarry*, Clarion township. *Ferriferous limestone ore.* Ore occurs in balls.

Hard and tough; rather coarse grained; surface somewhat oxidized; bluish grey.

Clarion County.

	(*164*) *Fairmount Coal Co.*
Carbonate of iron,	37.596
Sesquioxide of iron,	1.571
Alumina,	4.851
Carbonate of lime,	25.089
Carbonate of magnesia,	6.008
Sulphur,	.083
Phosphorus,	.474
Silicious matter,	20.100
Metallic iron,	19.250
Phosphorus in 100 parts iron,	2.462

(*164*) *Fairmount Coal Company's* quarry, at New Bethlehem, in Red Bank township. From the horizon of the *Johnstown Cement bed.*

Reddish grey; brittle, with irregular fracture.

Forest County.

Brown Hematite.

	(*165*) *A. B. Kelly.*
Sesquioxide of iron,	58.000
Sesquioxide of manganese,	3.032
Alumina, (by difference,)	2.107
Lime,	.870
Magnesia,	.230
Sulphuric acid,	.030

Phosphoric acid,	.831
Water and organic matter,	11.220
Silicious matter,	23.680
	100.000
Metallic iron,	40.600
Metallic manganese,	2.111
Sulphur,	.012
Phosphorus,	.363
Phosphorus in 100 parts iron,	.894

(*165*) *A. B. Kelly*, at Tionesta, in Tionesta township, 500 feet, more or less, above the Allegheny river. *Brown hematite of the Coal Measures.*

More or less cellular; somewhat coated with a yellowish white clay. Generally dark brown. (J. M. S.)

Butler County.

Carbonate Iron Ores.

	(*166*) *Hindman.*
Metallic iron,	36.600
Sulphur,	.052
Phosphorus,	.493
Silicious matter,	23.905
Phosphorus in 100 parts iron,	1.347

(*166*) *The Hindman farm*, three miles from Harrisville. Sample sent to Laboratory by Mr. Harry Snyder, Sharon.

A mixture of dark blue carbonate ore with cellular brown hematite. Rough, irregular fracture.

Butler County.

	(*167*) *Mobly.*
Carbonate of iron,	47.642
Sesquioxide of iron,	1.500
Alumina,	5.390
Carbonate of lime,	20.803
Carbonate of magnesia,	4.964
Sulphur,	.133
Phosphorus,	.508
Silicious matter,	15.920
Metallic iron,	24.050
Phosphorus in 100 parts iron,	2.112

(*167*) *Major Mobly's opening*, at Argyle; horizon of the *Kittanning Upper limestone.*

Brecciated; comparatively soft; bluish grey.

Mercer County.

Carbonate Ore.

	(*168*) *Wm. Walker.*
Metallic iron,	26.800
Sulphur,	.632
Phosphorus,	.366
Silicious matter,	29.510
Phosphorus in 100 parts iron,	1.365

(*168*) *Wm. Walker.* Ore from Fairview township, about one half mile from Otter creek; about five miles north of Mercer; twelve miles from Greenville; and one mile above Coolspring station on the Shenango and Allegheny railroad. (J. M. S.)

Crawford County.

Carbonate Ore.

	(*169*) *Snodgrass.*
Metallic iron,	32.925
Sulphur,	.038
Phosphorus,	.213
Silicious matter,	18.090
Phosphorus in 100 parts iron,	.646

(*169*) *From land of Robt. Snodgrass*, one and one fourth miles from Jamestown, Mercer county. Sample sent to Laboratory by Mr. Harry Snyder, Sharon.

Argillaceous, bluish gray; with small pits of pulverulent silicate of alumina; fracture irregular.

CHAPTER II.

Coals and Cokes.

In this chapter are included the analyses of ninety-two coals and ten cokes from Armstrong, Clarion, Jefferson, Elk, Cameron, Clinton, Lycoming, Sullivan, and Bradford counties. They represent chiefly the coals of the Lower Productive Coal Measures; and as a description of the different coal beds has already been given in Report MM., these analyses are published without further comment.

Coals.

	Armstrong County.			
	(*170*) *Ewing.*	(*171*) *Schrecengost.*	(*172*) *Patterson.*	(*173*) *Beer.*
Water @ 225°,	.800	.910	1.020	1.140
Volatile matter,	36.900	34.270	36.995	37.860
Fixed carbon,	50.230	53.224	53.569	57.179
Sulphur,	3.040	2.311	2.641	1.031
Ash,	9.030	9.285	5.775	2.790
	100.000	100.000	100.000	100.000
Color of ash,	pinkish-grey.	grey.	cream.	cream.
Coke, per cent.,	62.300	64.820	61.985	61.000
Fuel ratio,	1 : 1.36	1 : 1.55	1 : 1.45	1 : 1.51

(*170*) *H. M. Ewing's mine*, Elder's Ridge, two miles south west of West Lebanon. *Pittsburgh coal.*

Luster dull black; very compact; numerous partings of pyrites.

(*171*) *B. U. Schrecengost's mine*, two miles west of Rural village, Cowanshannock township. *Freeport Lower coal.*

Luster generally deep black; alternating bands of bright crystalline coal and dull black coal make up the mass. Very firm and compact.

(*172*) *J. F. Patterson's property*, two miles west of Rural village, Cowanshannock township. *Gallitzin coal.*

Luster deep black; generally very firm. Partings of charcoal and pyrites rather numerous.

(*173*) *Beer's estate*, at North Star, three miles south west of Rural village, Cowanshannock township. *Freeport upper coal.*

Luster deep black; firm and compact; shows numerous partings of mineral charcoal and some pyrites.

	Armstrong County.	
	(*174*) *Rhea.*	(*175*) *Marshall.*
Water @ 225°,	.960	1.040
Volatile matter,	38.205	32.330
Fixed carbon,	52.032	49.450
Sulphur,	3.663	2.000
Ash,	5.140	15.180
	100.000	100.000
Color of ash,	reddish grey.	grey.
Coke, per cent.,	60.835	66.630
Fuel ratio,	1 : 1.36	1 : 1.53

(*174*) *J. C. Rhea's coal*, one half mile east of Greensdale, Valley township. *Kittanning Lower coal.*

Luster dull; firm and compact; partings of pyrites numerous.

(*175*) *T. H. Marshall's property*, one half mile west of Dayton, Wayne township. *Freeport Upper coal.*

Luster deep black; firm and compact; bands of ashy coal throughout specimens. Shows considerable charcoal and pyrites.

Armstrong County.

	Mrs. Thompson's Mine.		
	(*176*) *Upper bench.*	(*177*) *Middle bench.*	(*178*) *Lower bench.*
Water @ 225°,	1.220	1.610	.810
Volatile matter,	37.930	37.820	34.465
Fixed carbon,	52.757	53.132	54.482
Sulphur,	1.388	.678	.588
Ash,	6.705	6.750	9.655
	100.000	100.000	100.000
Color of ash,	grey, red tinge.	grey.	grey.
Coke, per cent.,	60.850	60.560	64.725
Fuel ratio,	1 : 1.39	1 : 1.40	1 : 1.58

(*176*) *Mrs. Thompson's mine*, two miles south west of New Salem, Red Bank township. *Kittanning Upper coal bed; upper bench.*

Luster dull; very firm and compact; thin partings of pyrites rather numerous; laminæ somewhat indistinct.

(*177*) *Mrs. Thompson's mine*, two miles south west of New Salem, Red Bank township. *Kittanning Upper coal bed; top of middle bench.*

Dull black, cannel-like; fracture irregular, somewhat conchoidal.

(*178*) *Mrs. Thompson's mine*, two miles south west of New Salem, Red Bank township. *Kittanning Upper coal bed; bottom of middle bench.*

Luster dull, cannel-like; fracture irregular, somewhat conchoidal; laminæ indistinct.

Armstrong County.

	(179) *Brooks.*	(180) *Colwell.*	(181) *Colwell.*
Water @ 225°,	.640	1.450	1.070
Volatile matter,	32.665	34.810	37.110
Fixed earbon,	52.306	54.996	50.265
Sulphur,	1.044	1.054	3.225
Ash,	13.345	7.690	8.330
	100.000	100.000	100.000
Color of ash,	grey.	grey.	pinkish grey.
Coke, per eent.,	66.695	63.740	61.820
Fuel ratio,	1 : 1.60	1 : 1.58	1 : 1.35

(*179*) *Brooks mine*, on Cathcart run, two miles northeast of Putneyville. *Kittanning Upper coal bed.*

Luster dull, cannel-like; somewhat coated with silt; bands of ashy coal throughout specimens.

(*180*) *J. A. Colwell*, one half mile north west of Putneyville. *Freeport Upper coal.*

Luster deep black; somewhat coated with a yellowish white silt; numerous partings of charcoal.

(*181*) *J. A. Colwell*, one half mile north west of Mahoning furnace. *Freeport Lower coal.*

Deep black, firm and compact, with numerous partings of pyrites.

Armstrong County.

	(182) *Stewardson furnace.*	(183) *Mahoning Coal Co.*
Water @ 225°,	1.470	1.180
Volatile matter,	35.520	42.550
Fixed earbon,	55.545	49.686
Sulphur,	.835	1.999
Ash,	6.630	4.585
	100.000	100.000
Color of ash,	yellowish grey.	pinkish grey.
Coke, per cent.,	63.010	56.270
Fuel ratio,	1 : 1.56	1 : 1.17

(*182*) *At Stewardson furnace*, one mile east from mouth of Mahoning creek, in Madison township. F. B. & A. Laughlin. *Freeport Upper coal.*

Hard, compact, brittle; with deep black, shining luster. Shows considerable mineral charcoal and some pyrites.

(*183*) *Mahoning Coal Company*, at mouth of Mahoning creek. *Kittanning Lower Coal.*

Hard, brittle, deep black; with numerous thin partings of pyrites.

Armstrong County.

	(*184*) *Mortimer.*	(*185*) *Reynolds.*	(*186*) *Reed.*	(*187*) *Laufman & Co.*
Water @ 225°, . . .	.740	.950	1.010	1.410
Volatile matter, . .	35.715	40.855	40.210	38 560
Fixed carbon, . . .	51.049	51.694	47.366	52.249
Sulphur, ...	.936	1.366	3.824	2.381
Ash, ...	11.560	5.135	7.590	5.400
	100.000	100.000	100.000	100.000
Color of ash, ...	cream.	white.	cream.	cream.
Coke, per cent., .	63.545	58.195	58.780	60.030
Fuel ratio, ...	1:1.43	1:1.26	1:1.18	1:1.35

(*184*) *From the bluff opposite Mr. John Mortimer's house*, near Slabtown, Boggs township. *Brookville coal.*

Luster dull, with bands of ashy coal throughout specimens. Some portions have the general appearance of a cannel coal. Shows considerable pyrites in minute specks throughout the mass.

(*185*) *Ross Reynold's property*, one half mile north of Kittanning, Valley township. *Kittanning Lower coal.*

Deep black, shining luster; generally firm and compact; seems in the main free from slate and pyrites.

(*186*) *D. Reed's coal*, Centre Hill, three miles west of Kittanning. *Freeport Lower coal.*

Firm and compact; luster dull black; more or less stained iron oxide; considerable mineral charcoal and iron pyrites in thin partings.

(*187*) *Laufman & Co.*, at Apollo, Kiskiminitas township. *Freeport Upper coal.*

Coal, of a deep black color, is seamed with mineral charcoal and iron pyrites. It carries an unusually large amount of carbonate of lime in thin scales disseminated throughout the mass.

	Armstrong County.			
	(*188*) *Hagy.*	(*189*) *Rogers.*	(*190*) *Winfield Furnace.*	(*191*) *Wangler.*
Water @ 225°,	1.430	1.160	1.010	1.310
Volatile matter,	39.835	42.720	42.650	45.025
Fixed carbon,	50.206	48.742	48.661	46.916
Sulphur,	2.819	2.313	1.644	2.954
Ash,	5.710	5.065	6.035	3.795
	100.000	100.000	100.000	100.000
Color of ash,	cream.	reddish grey.	pinkish grey.	pink.
Coke, per cent.,	58.735	56.120	56.340	53.665
Fuel ratio,	1 : 1.26	1 : 1.14	1 : 1.14	1 : 1.04

(*188*) *John Hagy's property*, north end of Freeport town, South Buffalo township. *Freeport Upper coal.*

Generally firm and compact; luster deep black, shining; considerable pyrites in thin partings; laminæ rather indistinct.

(*189*) *R. Rogers' mine*, two miles west of Buffalo Mills, on Butler county line. *Kittanning Lower coal.*

Somewhat coated with iron oxide; iridescent; deep black on fresh fracture; considerable pyrites in partings.

(*190*) *Winfield furnace property*, on Rough run, near Winfield furnace, two and one half miles north west of Slate Lick. *Clarion coal.*

Luster generally dull, with bands of bright crystalline coal throughout specimens. Very firm; with pyrites in thin partings.

(*191*) *J. A. Wangler's mine*, on Fox farm, one and one half miles north west of Parker City. *Clarion coal.*

Hard and exceedingly compact; laminæ rather indistinct; luster generally deep black, pitchy; portions of the specimen strongly iridescent. Thin partings of pyrites numerous.

	Clarion County.			
	(*192*)	(*193*)	(*194*)	(*195*)
	Fairmount Coal Co.'s Mines.			
Water @ 225°,	1.320	.850	.930	1.050
Volatile matter,	40.565	39.655	41.000	38.955
Fixed carbon,	53.980	49.787	48.571	41.357
Sulphur,	1.490	1.548	1.534	5.773
Ash,	2.645	8.160	7.965	12.865
	100.000	100.000	100.000	100.000

Color of ash, ...	reddish grey.	reddish grey.	white.	pink.
Coke, per cent., ...	58.115	59.495	58.070	59.995
Fuel ratio, ...	1 : 1.33	1 : 1.25	1 : 1.18	1 : 1.06

(*192*) *Fairmount Coal Co.'s mines*, near New Bethlehem. *Bank No. 1, Freeport Lower coal.*

Deep black; brittle; laminæ rather indistinct; partings of mineral charcoal rather numerous.

(*193*) *Fairmount Coal Co.'s mines*, near New Bethlehem. *Bank No. 4, Upper bench. Kittanning Lower coal.*

Luster deep black; bands of bright-pitchy coal run throughout the specimens; also bands of greyish black ashy coal.

(*194*) *Fairmount Coal Co.'s mines*, near New Bethlehem. *Bank No. 4, Middle bench. Kittanning Lower coal.*

Same general appearance as No. (*193*).

(*195*) *Fairmount Coal Co.'s mines*, near New Bethlehem. *Bank No. 4, lower bench. Kittanning Lower coal.*

Luster deep black; rather tender; carries an unusually large number of thin partings of iron pyrites more or less decomposed.

Clarion County.

	(*196*)	(*197*)	(*198*)	(*199*)
	Fairmount Coal Co.'s Mines.			
Water @ 225°, ...	4.765	1.260	1.300	.900
Volatile matter, ...	35.675	35.130	35.825	39.695
Fixed carbon, ...	54.037	51.397	54.223	48.405
Sulphur, ...	.913	1.988	1.312	3.440
Ash, ...	4.610	10.225	7.340	7.510
	100.000	100.000	100.000	100.000
Color of ash, ...	cream.	grey.	grey.	lilac.
Coke, per cent., ...	59.560	63.610	62.875	59.355
Fuel ratio, ...	1 : 1.51	1 : 1.43	1 : 1.51	1 : 1.23

(*196*) *Fairmount Coal Co.'s mines*, near New Bethlehem. Average. *Kittanning Middle coal.* Bed 2′ thick.

Luster dull, dead; more or less coated with silt; brittle; shows but little pyrites.

Coal yields an inferior coke, and after being dried absorbs water with great rapidity.

(*197*) *Fairmount Coal Co.'s mines*, near New Bethlehem. *Freeport Lower coal; unwashed slack.*

(*198*) *Fairmount Coal Co.'s mines*, near New Bethlehem. *Freeport Lower coal; washed slack.*

(*199*) *Fairmount Coal Co.'s mines*, near New Bethlehem. *Kittanning Lower coal. Slack coal.*

Clarion County.

	(*200*) *Goheen.*	(*201*) *Goheen.*	(*202*) *McNutt.*	(*203*) *McClure.*
Water @ 225°,	1.520	1.170	1.850	1.640
Volatile matter,	35.320	39.155	38.510	37.115
Fixed carbon,	54.448	51.388	54.669	56.357
Sulphur,	·672	2.067	1.046	1.163
Ash,	8.040	6.220	3.925	3.725
	100.000	100.000	100.000	100.000
Color of ash,	cream.	grey.	reddish grey.	cream.
Coke, per cent.,	63.160	59.675	59.640	61.245
Fuel ratio,	1:1.54	1:1.31	1:1.42	1:1.51

(*200*) *Goheen's bank*, Porter township. *Freeport Upper coal.* Bed 4′ 9″ thick. Average. Sample exposed on dump for some time; probably outcrop coal.

Luster deep black; more or less stained with iron oxide. Bands of slaty coal throughout specimen. Seems in the main free from pyrites.

(*201*) *Goheen's bank*, Porter twp. *Freeport Lower coal.* Bed 7′ thick, with no slate partings.

Luster deep black; generally very firm and compact; partings of pyrites somewhat numerous; shows numerous fossil impressions partially filled in with pyrite.

(*202*) *McNutt's (now Smullen's) mine*, Porter twp. *Freeport Lower coal.* Bed 8′ thick.

Luster dull; somewhat coated with iron oxide; brittle; shows but little pyrites.

(*203*) *J. McClure's (Wilkins') mine*, Porter twp. *Freeport Lower coal.*

Average of lowermost 6′ of coal. Bed 8′ thick; upper 2′ slaty.

Luster, rather dull; somewhat coated with iron oxide; slightly iridescent.

Clarion County.

	(*204*) *Songer.*	(*205*) *Sloan.*	(*206*) *Clarion Coal Co.*	(*207*) *Murphy.*
Water @ 225°,	1.020	1.750	2.060	4.775
Volatile matter,	40.425	36.440	38.075	35.118
Fixed carbon,	47.511	55.438	56.782	53.632
Sulphur,	3.789	1.072	.818	1.095
Ash,	7.255	5.300	2.265	5.380
	100.000	100.000	100.000	100.000
Color of ash,	reddish grey.	reddish grey.	cream.	cream.
Coke, per cent,	58.555	61.810	59.865	60.107
Fuel ratio,	1:1.17	1:1.52	1:1.49	1:1.52

(*204*) *Songer's mine*, Shannondale, Red Bank township. *Kittanning Lower coal.* Average sample from run of mine. Bed 3′ to 3′ 4″ thick. No slate partings.

Luster, dull black; considerably coated with iron oxide. Pyrites present in very minute crystals.

(*205*) *Sloan bank*, Limestone township. *Kittanning Lower coal.*

Deep black; somewhat iridescent; laminæ rather indistinct; somewhat coated with iron oxide.

(*206*) *Clarion Coal Co.'s mines*, at Clarion, Clarion township. *Kittanning Lower coal.* Average sample.

Generally very compact; luster, deep black; specimens seen in the main free from pyrites and slate partings.

(*207*) *T. Murphy's bank*, Madison township. *Freeport Lower coal.* Average sample of lot exposed to weather.

Luster, dull black; bands of greyish black coal throughout specimens. Compact and brittle, with somewhat cubical fracture. Coal yields an inferior coke, and when dried reabsorbs water with great rapidity.

Clarion County.

	(*208*) *Sligo Branch Coal Co.*	(*209*) *Somerville.*	(*210*) *Fox.*	(*211*) *McCall.*
Water @ 225°,	1.370	1.410	1.470	2.070
Volatile matter,	41.575	36.900	41.355	35.695
Fixed carbon,	49.816	46.917	49.930	55.275
Sulphur,	2.824	1.583	2.070	.830
Ash,	4.415	13.190	5.175	6.130
	100.000	100.000	100.000	100.000

Color of ash, ...	cream.	grey, red tinge.	grey, red tinge.	grey, red tinge.
Coke, per cent., ...	57.055	61.690	57.175	62.235
Fuel ratio, ...	1 : 1.19	1 : 1.27	1 : 1.21	1 : 1.55

(*208*) *Sligo Branch Coal Co.*, Rimersburg, Toby township. *Kittanning Lower coal.* Average sample.

Deep black, shining; shows a good deal of pyrites in masses throughout specimens.

(*209*) *T. O. Somerville's bank*, Toby township. *Kittanning middle coal.* Average sample.

Luster, deep black; numerous bands of greyish black ashy coal throughout specimens. Rather compact and brittle.

(*210*) *Fox bank*, Piney township. *Kittanning Lower coal.* Average sample.

Luster, deep black, shining; brittle; pyrites in minute crystals in partings.

(*211*) *McCall's bank*, West Freedom, Perry township. *Kittanning Lower coal.*

Deep black, shining; brittle; shows a small amount of pyrites in minute crystals.

Jefferson County.

	(*212*) *Keslar.*	(*213*) *McCracken.*	(*214*) *Blose.*	(*215*) *Blose.*
Water @ 225°, ...	1.160	1.110	.500	.880
Volatile matter, ...	33.020	36.023	35.125	32.173
Fixed carbon, ...	62.228	55.804	49.462	53.496
Sulphur, ...	1.062	2.593	3.498	3.361
Ash, ...	2.530	4.470	11.415	10.090
	100.000	100.000	100.000	100.000
Color of ash, ...	orange.	reddish grey.	grey, pink tinge.	grey, pink tinge.
Coke, per cent., ...	65.820	62.867	64.375	66.947
Fuel ratio, ...	1 : 1.88	1 : 1.55	1 : 1.41	1 : 1.66

(*212*) *Property of J. Keslar*, four and one half miles north from Punxsutawney. *Freeport Lower coal.(?)*

Luster, rather dull; generally firm and compact; thin partings of pyrites.

(*213*) *McCracken Bros.*, one and one half miles west from Frostburg. *Freeport Lower coal.*

Luster, deep black, shining; rather tender; numerous partings of charcoal and pyrites.

(*214*) *From the property of Geo. Blose*, one mile north from Perrysville. *Freeport Lower coal; upper bench.*

Luster, dull black generally; rather compact; appearance somewhat slaty with laminated structure. Very friable, with a tendency to break in plates.

(*215*) *From the property of Geo. Blose*, one mile north from Perrysville. *Freeport Lower coal; lower bench.*

Jefferson County.

	(*216*) *Huffman.*	(*217*) *Eshbaugh.*	(*218*) *Mineweaver.*
Water @ 225°,	1.540	1.390	1.350
Volatile matter,	37.605	38.275	39.615
Fixed carbon,	56.762	54.720	48.532
Sulphur,	1.103	1.525	1.238
Ash,	2.990	4.090	9.265
	100.000	100.000	100.000
Color of ash,	brown.	cream.	grey.
Coke, per cent.,	60.855	60.335	59.035
Fuel ratio,	1 : 1.51	1 : 1.43	1 : 1.22

(*216*) *A. Huffman's property*, two miles north-east from Worthville. *Freeport Lower coal.(?)*

Luster, dull; considerably coated with infiltrated silt; somewhat iridescent; seems in the main free from slate partings.

(*217*) *A. Eshbaugh's mine*, one mile west from Knoxville. *Freeport Lower coal.*

Luster, deep black; rather firm and compact; considerable pyrites in thin partings.

(*218*) *From property of Joseph Mineweaver*, three miles north, north west of Brookville. *Brookville coal.*

Deep black, more or less pitchy; very compact; numerous thin partings of pyrites throughout specimens.

Jefferson County.

	(*219*) *Cowan.*	(*220*) *Williams.*
Water @ 225°,	1.940	2.080
Volatile matter,	34.440	34.065
Fixed carbon,	54.000	51.498
Sulphur,	.890	.827
Ash,	8.730	11.530
	100.000	100.000

Color of ash,	grey, red tinge.	grey, red tinge.
Coke, per cent.,	63.620	63.855
Fuel ratio,	1 : 1.56	1 : 1.51

(*219*) *W. B. Cowan's mine*, one fourth mile north of Roseville.

Dull black generally; bands of slaty coal throughout specimens; seems in the main free from pyrites.

(*220*) *J. William's mine*, one fourth mile south from Corsica.

Dull black, somewhat iridescent; bands of slaty coal throughout specimens; generally free from pyrites.

Elk County.

	(*221*) *Johnson.*	(*222*) *Brown.*	(*223*) *Wilson.*	(*224*) *Romig.*
Water @ 225°,	2.140	1.030	.920	.990
Volatile matter,	31.635	32.160	32.440	31.610
Fixed carbon,	59.195	57.929	58.297	59.815
Sulphur,	1.205	1.705	2.813	2.400
Ash,	5.825	7.176	5.530	5.185
	100.000	100.000	100.000	100.000
Color of ash,	reddish grey.	grey, red tinge.	grey, pink tinge.	reddish grey.
Coke, per cent.,	66.225	66.810	66.570	67.400
Fuel ratio,	1 : 1.87	1 : 1.80	1 : 1.79	1 : 1.89

(*221*) *Ben Johnson mine*, Benezette township, three and one half miles north east of Benezette. *Clermont or Clarion coal.* 3′ 10″ thick.

Luster, dull black; considerably coated with silt; very friable; shows but little pyrites.

(*222*) *Geo. Brown's mine*, Benezette township, two and one half miles north east of Benezette. *Clermont or Clarion coal.* 4′ thick.

Luster, generally dull black; considerably coated with silt; rather tender; shows but little pyrites.

(*223*) *H. R. Wilson mine*, Benezette township, two miles north east of Benezette. *Alton (?) coal.* 3′ 10′ thick.

Coal bright and very tender; considerably coated with a white efflorescence of sulphate of iron. Shows some pyrites in thin partings.

(*224*) *Romig mine*, at Benezette, Benezette township. *Alton Upper coal.* 2′ 8″ thick.

Luster, bright; shining; rather tender; numerous thin plates and knife edges of pyrites throughout specimens.

Elk County.

	(225) *Turley.*	(226) *Dennison.*
Water at 225°,	1.080	1.290
Volatile matter,	33.335	32.455
Fixed carbon,	58.566	54.342
Sulphur,	1.514	.753
Ash,	5.505	11.160
	100.000	100.000
Color of ash,	grey.	reddish grey.
Coke, per cent.,	65.585	66.255
Fuel ratio,	1 : 1.76	1 : 1.67

(*225*) *J. E. Turley mine*, Jay township, one half mile north of Weedville. *Alton coal* (*?*). 4′ thick.

Luster, bright, shining; rather firm; shows considerable mineral charcoal and numerous knife edges of pyrites.

(*226*) *V. Dennison mine*, Jay township, Windfall run. *Alton Upper coal* (*?*). 3′ 9″ thick.

Luster rather dull; bands of slaty coal throughout specimens; shows some beautiful stalactitic prolongations of pyrite.

Elk County.

	(227)	(228)	(229)
	North Western Mining and Exchange Company.		
Water @ 225°,	1.700	.890	1.080
Volatile matter,	36.820	33.192	38.455
Fixed carbon,	56.503	47.779	53.190
Sulphur,	1.362	2.959	1.975
Ash,	3.615	15.180	5.300
	100.000	100.000	100.000
Color of ash,	brown.	grey, pink tinge.	grey, pink tinge.
Coke, per cent.,	61.480	65.918	60.465
Fuel ratio,	1 : 1.53	1 : 1.44	1 : 1.38

(*227*) *North Western Mining and Exchange Company's mine*, Daguscahonda P. O., Fox township. *Second bed above the Dagus.* 3′ 7″ thick.

Generally coated with iron oxide; on fresh fracture, deep black; seems in the main free from slate; breaks with somewhat even fracture, showing considerable pyrites in minute crystals.

(*228*) *North Western Mining and Exchange Company's mine*, Daguscahonda P. O., Fox township. *First bed above the Dagus.* 3′ 11″ thick.

Deep black, pitchy: seamed with bands of greyish black ashy coal. Carries considerable iron pyrites in thin partings.

(*229*) *North Western Mining and Exchange Company's mine*, Fox township. *Dagus coal bed.* Average thickness, 3′ 6″.

Deep black, shining; brittle; shows numerous thin parting of pyrites in minute crystals—partially decomposed.

Elk County.

	(*230*) *Hays.*	(*231*) *Eureka mines.*	(*232*) *Eureka mines.*
Water @ 225°,	1.490	1.000	.990
Volatile matter,	36.090	36.665	34.813
Fixed carbon,	49.199	47.766	48.219
Sulphur,	2.866	1.579	3.338
Ash,	10.355	12.990	12.640
	100.000	100.000	100.000
Color of ash,	reddish grey.	grey.	pink.
Coke, per cent.,	62.420	62.335	64.197
Fuel ratio,	1: 1.36	1: 1.30	1: 1.38

(*230*) *Enos Hays' mine*, Fox township, one mile north west of Kyler's Corners. Thickness of bed, 6 feet.

Dull black; somewhat coated with iron oxide; rather friable; shows partings of pyrites and numerous bands of slaty coal.

(*231*) *Eureka mines*, Peter Connor tract, Daguscahonda R.R., Fox township. D. Eldredge, operator. *Alton middle coal.*

Luster, dull black; generally very compact; numerous bands of bony coal throughout specimens.

(*232*) *Eureka mines*, Peter Connor tract, Daguscahonda

R.R., Fox township. D. Eldredge, operator. *Alton upper coal.*

Luster, generally dull black; specimens show numerous bands of bony coal, and a large amount of iron pyrites in thin partings.

Elk County.

	(233) *Silver Creek mine.*	(234) *St. Mary's Coal Co.*	(235) *St. Mary's Coal Co.*	(236) *St. Mary's Coal Co.*
Water @ 225°,	.870	.990	1.190	1.050
Volatile matter,	37.890	38.355	33.990	39.295
Fixed carbon,	52.657	52.826	50.992	48.001
Sulphur,	.838	2.044	3.118	3.324
Ash,	7.745	5.785	10.710	8.330
	100.000	100.000	100.000	100.000
Color of ash,	cream.	reddish grey.	lilac.	pink.
Coke, per cent.,	61.240	60.655	64.820	59.655
Fuel ratio,	1 : 1.39	1 : 1.37	1 : 1.50	1 : 1.22

(*233*) *Silver Creek mine*, Benzinger township D. Eldredge, operator. *Clermont coal.* Average thickness, two feet.

Deep black, shining; brittle; seems in the main free from pyrites.

(*234*) *St. Mary's Coal Co.'s Tannerdale mine*, two miles north east from St. Mary's. *Dagus coal.* Thickness, two feet six inches.

Dull black; more or less coated with iron oxide; partings of pyrites in very minute crystals partly decomposed.

(*235*) *St. Mary's Coal Co.'s mine; east side;* at St. Mary's, Benzinger township. *Dagus coal.* Thickness, three feet two inches.

Dull black; brittle; iridescent; partings of pyrites and slaty coal rather numerous in specimens.

(*236*) *St. Mary's Coal Co.'s mine; west side;* at St. Mary's, Benzinger township. *Dagus coal.* Average thickness, three feet.

Dull black; more or less stained with iron oxide; rather friable; partings of pyrites and slaty coal rather numerous.

Elk County.

	(237) *Cascade.*	(238) *Gresh.*	(239) *Glen Mayo.*	(240) *Gen. Kane.*
Water @ 225°,	.990	.960	1.010	2.460
Volatile matter,	40.585	34.230	38.450	37.990
Fixed carbon,	49.416	50.407	41.593	52.816
Sulphur,	3.369	1.398	3.952	.814
Ash,	5.640	13.005	14.995	5.920
	100.000	100.000	100.000	100.000
Color of ash,	pink.	grey.	lilac.	yellow.
Coke, per cent.,	58.425	64.810	60.540	59.550
Fuel ratio,	1:1.22	1:1.47	1:1.08	1:1.39

(*237*) *Cascade mine*, at St. Mary's. *Dagus coal.* Average thickness, 3′ 8″.

Luster, deep black, shining; somewhat coated with silt; shows considerable pyrites partially decomposed.

(*238*) *E. K. Gresh mine*, Ridgway, Ridgway twp. *Marshburg Lower coal*, 2′ 5″ thick.

Luster, dull black; laminæ rather indistinct; numerous bands of slaty coal throughout specimens.

(*239*) *Glen Mayo colliery*, one mile south of Willmarth, Ridgway twp. *Alton coal.*

Luster, rather bright; generally firm and compact; numerous thin bands of bony coal, and a large amount of iron pyrites in thin partings throughout specimens.

(*240*) *Gen. Kane's Roberts' Lot*, Jones twp. *Hoyt bed*, 2′ 11″ thick.

Luster, dull black; appearance somewhat cannel-like; laminæ indistinct; fracture generally irregular, but with a tendency to cubical.

Cameron County.

	(241) *Mt. Hope colliery.*	(242) *Mt. Hope Coal Co.*
Water @ 225°,	.990	.920
Volatile matter,	34.395	32.220
Fixed carbon,	60.195	53.904
Sulphur,	.865	3.481
Ash,	3.555	9.475
	100.000	100.000
Color of ash,	cream.	pinkish grey.
Coke, per cent.,	64.615	66.860
Fuel ratio,	1:1.75	1:1.67

(*241*) *Mt. Hope colliery*, one mile north west of Cameron Station, Shippen twp. Jacob Elias, proprietor. *Dagus bed*, 3′ thick.

Luster, dull black; generally very firm; somewhat coated with silt. Shows only a few thin scales of pyrites.

(*242*) *Mt. Hope Coal Co's opening*, one half mile west from Mt. Hope colliery, Canoe run, Shippen twp. *Clermont or Clarion bed.* "Five foot bed." 4′ to 5′ thick.

Luster, generally bright, shining; rather firm; shows numerous thin partings or knife edges of pyrites and considerable mineral charcoal.

Clinton County.

	(*243*) *Merriman & Co.*
Water at 225°,	.760
Volatile matter,	21.465
Fixed carbon,	66.069
Sulphur,	2.631
Ash,	9.075
	100.000
Color of ash,	grey, pink tinge.
Coke, per cent.,	77.775
Fuel ratio,	1:3.08

(*243*) *H. Merriman & Co.*, Williamsport.
Luster bright; considerable pyrites in minute crystals.

Lycoming County.

	(*244*)	(*245*)	(*246*)
	McIntyre Coal Company.		
Water @ 225°,	.720	.740	·510
Volatile matter,	17.420	17.360	16.860
Fixed carbon,	78.106	78.153	63.898
Sulphur,	.564	.567	.782
Ash,	3.190	3.180	17.950
	100.000	100.000	100.000
Color of ash,	grey.	grey.	grey.
Coke, per cent.,	81.860	81.900	82.630
Fuel ratio,	1: 4.48	1: 4.50	1: 3.79
Specific gravity,	1.363	——	1.440

(*244*) *McIntyre Coal Co.'s mines*, Ralston. *Coal bed E.*

Color, deep black; luster, shining; generally free from slate and pyrites; seamed with mineral charcoal.

(*245*) Duplicate analysis of (*244*) by John M. Stinson.

(*246*) *McIntyre Coal Co.'s mines*, Ralston. *Coal bed B.* Dull black; generally free from pyrites; carries numerous bands of slaty coal.

Lycoming County.

Red Run Coal Company.

	(*247*) *Carter.*	(*248*) *Old Red Run.*	(*249*) *Butler.*	(*250*) *Old mines.*
Water @ 225°,	1.220	.730	.950	1.510
Volatile matter,	15.825	16.930	16.235	16.780
Fixed carbon,	72.474	74.116	70.602	68.814
Sulphur,	.636	. 677	.688	.621
Ash,	9.845	7.547	11.525	12.275
	100.000	100.000	100.000	100.000
Color of ash,	grey.	grey.	grey, pink tinge.	grey.
Coke, per cent.,	82.955	82.340	82.815	81.710
Fuel ratio,	1: 4.58	1: 4.38	1: 4.35	1: 4.10

(*247*) *Carter opening*, on the mountain on the west side of Lycoming creek. Red Run Coal Company. *Coal bed B.* Dull black; iridescent; somewhat coated with silt; carries thin slate partings.

(*248*) *Old Red Run mines*, Red Run Coal Company. Ralston coal basin. *Coal bed B.*

Deep black; iridescent; rather tender; somewhat coated with iron oxide.

(*249*) *Butler opening*, Red Run, Red Run Coal Company. Ralston coal basin, west of Lycoming creek. *Coal bed E.*

Luster, dull; somewhat coated with iron oxide; generally very firm; numerous thin partings of mineral charcoal.

(*250*) *At old mines*, Hoagland's run, in south east corner of Cogan House township.

Coal has a dull black luster; is generally firm and compact, and seems in the main free from pyrites; it yields an inferior quality of coke and reabsorbs water rapidly.

Lycoming County.

English Mine.

	(*251*) *Upper Bench.*	(*252*) *Middle Bench.*	(*253*) *Lower Bench.*	(*254*) *Average.*
Water @ 225°, ...	.760	.900	.860	.500
Volatile matter, . . .	19.700	20.250	19.820	19.945
Fixed carbon, ...	68.390	68.962	65.328	67.697
Sulphur, ...	.675	.593	.817	.533
Ash, ...	10.475	9.295	13.175	11.325
	100.000	100.000	100.000	100.000
Color of ash, ...	grey.	grey.	grey.	cream.
Coke, per cent., . . .	79.540	78.850	79.320	79.555
Fuel ratio, ...	1 : 3.47	1 : 3.40	1 : 3.29	1 : 3.34

(*251*) *English mine*, two and one half miles to three miles north from English Centre P. O., Pine township. On what were known as the "Herdic lands," now the Weightman property. *Big bed of coal; upper bench.*

Dull black luster; firm and compact; numerous bands of slaty coal and partings of charcoal. Specimens seem in the main free from pyrites.

(*252*) *English mine*, two and one half miles to three miles north form English Centre P. O., Pine township. On what were known as the "Herdic lands," now the Weightman property. *Big bed of coal; middle bench.*

Same general appearance as No. (*251*).

(*253*) *English mine*, two and one half miles to three miles north from English Centre P. O., Pine township. On what were known as the "Herdic lands," now the Weightman property. *Big bed of coal; lower bench.*

Same general appearance as No. (*251*).

(*254*) *English mine*, two and one half miles to three miles north from English Centre P. O., Pine township. On what were known as the "Herdic lands," now the Weightman property. Sample representing the average of the whole of the Big bed.

Dull black luster; firm and compact; numerous bands of slaty coal; seems in the main free from pyrites.

Lycoming County.

	(255) *Bannan.*	(256) *Baché.*	(257) *Long, Borleau & Co.*
Water @ 225°,	1.020	.450	3.830
Volatile matter,	21.865	20.040	22.985
Fixed carbon,	69.324	64.159	64.063
Sulphur,	.749	.656	.577
Ash,	7.042	14.695	8.545
	100.000	100.000	100.000
Color of ash,	cream.	grey.	reddish grey.
Coke, per cent.,	77.115	79.510	73.185
Fuel ratio,	1 : 3.17	1 : 3.20	1 : 2.79

(*255*) *Bannan mine*, three miles north from English Centre P. O., Pine township. *Coal bed D.*

Considerably coated with silt; has a dull black luster on fresh fracture; rather tender.

(*256*) *J. W. Baché's old mine*, three and one half miles north from English Centre P. O., on Little Pine Creek, Pine township.

Bright resinous luster; generally firm; seems in the main free from pyrites; carries numerous thin bands and lenticular masses of slaty coal.

(*257*) *From property of Long, Borleau & Co.*, (Jas. Long, Sam'l Borleau and Adam R. Reese,) Pine township, east of Little Pine creek. *Coal bed C.* Lower coal bed 4½′ thick. Outcrop. Washed coal.

Deep black; rather friable; seamed with mineral charcoal and bands of greyish black ashy coal; seems in the main free from pyrites; yields an inferior coke.

Sullivan County.

	(258)	(259) *State Line and Sullivan R.R. Co.*	(260)
Water @ 225°,	4.810	15.060	7.060
Volatile matter,	14.085	22.680	24.816
Fixed carbon,	64.436	50.993	55.796
Sulphur,	.549	.372	.407
Ash,	16.120	10.895	11.921
	100.000	100.000	100.000
Color of ash,	reddish grey.	reddish grey.	reddish grey.
Fuel ratio,	1 : 4.57	1 : 2.24	1 : 2.24

(*258*) *State Line and Sullivan R.R. Co.'s mines*, at Bernice. J. O. Blight, superintendent.

Coal of a deep black color; rather friable; much coated with infiltrated silt; partings of slate rather numerous. The coal yields gases burning with a non-luminous flame, but does not have the slightest tendency to form a coherent coke; after being dried it absorbs water with great avidity.

(*259*) *State Line and Sullivan R.R. Co.'s mines*, at Bernice. *Fine coal-wet.*

Luster, dull, dead; appearance shaly; soft and crumbling. Coal does not coke; yields gases which burn with a non-luminous flame. Reabsorbs water very rapidly, 60 per cent. in 2 hours.

(*260*) *Same sample air-dried.*

Bradford County.

	(*261*) *Long Valley Coal Co.*
Water @ 225°,	1.990
Volatile matter,	18.530
Fixed carbon,	67.423
Sulphur,	1.742
Ash,	10.315
	100.000
Color of ash,	pinkish grey.
Coke, per cent.,	79.480
Fuel ratio,	1 : 3.64

(*261*) *Long Valley Coal Co.'s opening*, two miles north east of Barclay.

Deep black; rather brittle; small knife edges of pyrites throughout specimens.

COKES.

	Lycoming County.	*Clinton County.*		*Armstrong County.*
	(*262*) *McIntyre Coal Co.*	(*263*) *Merriman & Co.*	(*264*) *Merriman & Co.*	(*265*) *Stewardson Furnace.*
Water @ 225°,	.405	1.000	.325	1.380
Volatile matter,	.891	1.467	.760	.794
Fixed carbon,	89.123	91.405	86.090	85.122
Sulphur,	.689	2.038	1.775	.968
Ash,	8.892	4.090	11.050	11.736
	100.000	100.000	100.000	100.000

Color of ash, ...	reddish grey.	reddish grey.	reddish grey.	reddish grey.

(*262*) *McIntyre Coal Company*, Ralston, Lycoming county. *Coke from unwashed coal.*

Luster dull; generally rather close-grained; lenticular masses of slate throughout specimens. Coke comparatively easily crushed.

(*263*) *Merriman & Co.*, Williamsport, Clinton county. *Coke from 4′ seam of coal. From lump coal.*

Rather close-grained; luster dull.

(*264*) *Merriman & Co.*, Williamsport, Clinton county. *Coke from 4′ seam of coal. From slack coal.*

Rather close-grained; luster dull; contains considerable slate.

(*265*) *Stewardson furnace*, one mile east from mouth of Mahoning creek, in Madison township, Armstrong county. F. B. & A. Laughlin. *Coke made in open pits at works, from Freeport Upper coal.*

Very open and tender; luster dull; considerable slate throughout.

	Clarion County.			
	(*266*)	(*267*)	(*268*)	(*269*)
	Fairmount Coal Company.			
Water @ 225°, ...	.210	.030	.020	.020
Volatile matter, . . .	.738	.623	.603	.510
Fixed carbon, ...	82.904	85.777	82.898	84.588
Sulphur, ...	1.360	2.107	2.936	2.672
Ash, ...	14.788	11.463	13.543	12.210
	100.000	100.000	100.000	100.000
Color of ash, ...	reddish grey.	red.	red.	reddish brown.

(*266*) *Fairmount Coal Company*, New Bethlehem. *Coke from Freeport Lower washed slack coal.*

Luster silvery; structure rather dense; numerous lenticular masses of slate, especially in center of specimen.

(*267*) *Fairmount Coal Company*, near New Bethlehem. *Coke from washed slack, Freeport Lower coal.*

Structure open; luster bright and silvery; small masses of slate throughout specimens.

(*268*) *Fairmount Coal Company*, near New Bethlehem. *Coke from washed slack, Kittanning Upper coal.*

Structure rather dense generally; luster for the most part bright, silvery. Considerable slate throughout specimens.

(*269*) *Fairmount Coal Company*, near New Bethlehem. *Coke from Kittanning Lower slack coal.*

Bright, silvery; rather close-grained and dense; small lenticular masses of slate throughout specimen.

Clarion County.

	(*270*) *Red Bank Furnace.*	(*271*) *Sligo Branch Coal Co.*
Water @ 225°,	.230	2.090
Volatile matter,	1.106	2.826
Fixed carbon,	88.360	84.248
Sulphur,	1.076	1.764
Ash,	9.228	9.072
	100.000	100.000
Color of ash,	reddish grey.	reddish grey.

(*270*) *Red Bank furnace*, Madison township. *Coke from Freeport Upper coal.*

Dull grey; structure rather open; somewhat iridescent; small masses of slate throughout specimens.

(*271*) *Sligo Branch Coal Company*, Reimersburg, Toby township. *Coke from Kittanning Lower coal.*

Appearance, dull, dirty; structure very open; numerous particles of slate throughout specimens.

Table showing the percentage of phosphorus in certain coals and cokes.

No. of analysis.	Name of Coal.	County.	Coal bed.	Phosphorus in coal.	Phosphorus in coke.
180	J. A. Colwell,	Armstrong,	Freeport Upper coal,	.0015	.0023
181	J. A. Colwell,	Armstrong,	Freeport Lower coal,	.0092	.0148
182	Stewardson furnace,	Armstrong,	Freeport Upper coal,	.0684	.1085
265	Stewardson furnace,	Armstrong,	Coke from Freeport Upper coal,	——	.0130
183	Mahoning Coal Co.,	Armstrong,	Kittanning Lower coal,	.0061	.0108
186	D. Reed,	Armstrong,	Freeport Lower coal,	.0013	.0022
187	Laufman & Co.,	Armstrong,	Freeport Upper coal,	.0030	.0049
189	R. Rogers,	Armstrong,	Kittanning Lower coal,	.0011	.0019
190	Winfield furnace,	Armstrong,	Clarion coal,	.1374	.2438
192	Fairmount Coal Co.,	Clarion,	Freeport Lower coal,	.0011	.0019
198	Fairmount Coal Co.,	Clarion,	Freeport Lower-washed slack coal,	.0061	.0088
269	Fairmount Coal Co.,	Clarion,	Coke from Kittanning Lower slack coal,	——	.0120
203	J. McClure, (Wilkins,)	Clarion,	Freeport Lower coal,	.0265	.0432
208	Sligo Branch Coal Co.,	Clarion,	Kittanning Lower coal,	.0010	.0017
210	Fox bank,	Clarion,	Kittanning Lower coal,	.0044	.0076
213	McCracken Bro.'s,	Jefferson,	Freeport Lower coal,	.0010	.0016
216	A. Huffman,	Jefferson,	Freeport Lower coal (?),	.0008	.0013
224	Romig,	Elk,	Alton Upper coal,	.0019	.0028
225	J. E. Turley,	Elk,	Alton coal (?),	.0012	.0018
227	N. W. Mining and Exchange Co.,	Elk,	(?)	tracc.	trace.
229	N. W. Mining and Exchange Co.,	Elk,	Dagus coal bed,	trace.	trace.
234	St. Mary's Coal Co.,	Elk,	Dagus coal bed,	.0012	.0019
242	Mt. Hope Coal Co.,	Cameron,	Clarion coal,	.0081	.0121
243	H. Merriman & Co.,	Clinton,	(?)	.0009	.0011
245	McIntyre Coal Co.,	Lycoming,	Bed E,	.0020	.0024
261	Long Valley Coal Co.,	Bradford,	(?)	.0060	.0076

CHAPTER III.

Limestones.

A more or less detailed description of the different limestone beds has already been given in Report MM, pp. 281 to 362, so that a repetition is here unnecessary. The analyses given in this report represent the limestones of Formations No. II, Siluro-Cambrian; No. VI, Lewistown limestone; No. VIII, Chemung limestone; No. IX, the Catskill limestones; and the limestones from the different horizons in the Coal Measures. The Mesozoic limestones are represented by the specimens from Welty's quarry in York county. These latter are characterized by containing quite a considerable percentage of lime and magnesia in the form of silicates.

Chester County.

	(272) *Swayne.*
Carbonate of lime,	54.071
Carbonate of magnesia,	43.309
Oxide of iron and alumina,	.613
Sulphur,	.013
Phosphorus,	.003
Silicious matter,	1.950
	99.959

(*272*) *Benjamin Swayne's quarry*, London Grove twp. *Limestone of II.*

Coarse-grained, crumbling; slightly brownish grey.

York County.

	(273)	(274)	(275)	(276)	(277)
	Welty's quarries.				
Lime,	44.950	44.220	47.000	42.940	43.920
Magnesia,	5.275	6.403	3.845	3.045	2.929
Ferrous oxide,	1.179	.864	.585	1.098	2.304
Manganous oxide,	trace.	trace.	trace.	trace.	trace.
Alumina,	2.460	2.320	1.690	2.680	5.090
Sulphur,	.004	.003	.004	.003	.005
Phosphorus,	.011	.012	.003	.013	.031

Carbonic acid,	31.040	34.030	34.985	30.072	17.020
Water,	1.460	1.150	1.270	1.160	1.720
Insoluble residue,	14.010	10.890	10.460	18.580	27.010
	100.389	99.892	99.842	99.591	100.029
The ignited insoluble residues contain:					
Silica,	11.603	8.766	7.710	13.144	25.320
Ferric oxide,	.039	.148	.211	.126	.113
Alumina,	.236	.126	.231	.524	.205
Lime,	.838	.634	1.238	2.560	.433
Magnesia,	.666	.465	.819	1.777	.304

(*273*), (*274*), (*275*), (*276*), (*277*). *Welty's quarries*, on the Dillsburg branch of the C. V. R. R., about a third of a mile north of the depot at Dillsburg. *Mesozoic limestone.*

Brecciated; rather hard and tough, with irregular fracture; color, generally greenish grey. Portions of the mass consist of a white saccharoidal limestone. Some of the specimens show beautiful dendritic impressions.

Cumberland County.

	(*278*) *Pine Grove.*	(*279*) *Craighead.*
Carbonate of lime,	72.321	86.357
Carbonate of magnesia,	20.591	5.236
Sesquioxide of iron,	4.420	.571
Alumina,	.083	
Sesquioxide of manganese,	.433	none.
Sulphur,	.011	.014
Phosphorus,	.047	.013
Silicious matter,	2.310	8.410

(*278*) *Pine Grove limestone*, at Pine Grove furnace. *Limestone of II.*

Rather hard; light grey and brownish grey; more or less coated and seamed with oxide of iron. (J. M. S.)

(*279*) *Craighead limestone quarry*, two miles north of Mt. Holly. Surface stone. *Limestone of II.*

Rather hard and fine-grained; dark bluish grey. (J. M. S.)

Franklin County.

	(*280*) *Mine No. 3.*	(*281*) *Mine No. 4.*
Carbonate of lime,	89.178	54.393
Carbonate of magnesia,	.961	42.694
Oxide of iron and alumina,	.806	.941
Phosphorus,	.050	.013
Silicious matter,	8.840	2.160

(*280*) *Limestone from Mine No. 3*, Mont Alto Iron Company, Mont Alto. Sample consisted of 106 pieces.

Rather soft; fracture conchoidal; color, yellowish brown. (J. M. S.)

(*281*) *Limestone from Mine No. 4*, Mont Alto Iron Company, Mont Alto. Sample consisted of 115 pieces.

Rather soft, irregular fracture; light bluish grey. (J. M. S.)

Franklin County.

(*282*)

Shiery quarry.

Carbonate of lime,	51.743
Carbonate of magnesia,	43.436
Carbonate of iron,	.665=.321 % iron.
Alumina,	.222
Sulphate of lime,	.046=.011 % sulphur.
Phosphate of lime,	.065=.013 % phosphorus.
Silica,	4.090
	100.267

(*282*) *Shiery quarry*, one and one half miles north east from Mont Alto. Sample (201 pieces) taken from different places in the several openings.

This deposit represents a true lithological dolomite, as shown by the following figures:

	Shiery.	*Dolomite.*
Carbonate of lime,	54.36	54.35
Carbonate of magnesia,	45.64	45.65
	100.00	100.00

Franklin County.

	(*283*) *S. Z. Hawbecker.*	(*284*) *S. Z. Hawbecker.*
Carbonate of lime,	97.321	67.257
Carbonate of magnesia,	1.286	30.702
Oxide of iron and alumina,	.260	.700
Phosphorus,	.005	.007
Silica,	.980	1.760
	99.852	100.426

(*283*) *S. Z. Hawbecker's quarry*, at Williamson. *Best quality.*

(*284*) *S. Z. Hawbecker's quarry*, at Williamson. *Worst quality.*

Franklin County.

	(285) Battin.
Carbonate of lime,	47.375
Carbonate of magnesia,	15.581
Oxide of iron and alumina,	6.760
Silica,	29.640
	99.356

(*285*) *M. E. Battin's cement quarry*, at Scotland.

Sample taken from layer 4′ thick in face of quarry; about the middle of Formation No. II.

A considerable quantity of limestone has been mined here for use as a cement; but the quarry is now abandoned.

Perry County.

	(286)	(287) Newport.	(288)
Carbonate of lime,	60.214	49.178	33.482
Carbonate of magnesia,	1.664	1.816	1.967
Oxide of iron and alumina,	5.384	5.761	8.298
Phosphorus,	.068	.052	.084
Silicious matter,	31.520	41.940	53.810

(*286*) *Near Newport*, on north east side of Juniata river, south of the Newport bridge. 4′ thick. *Chemung limestone.*

Specimen consists of a mass of comminuted shells cemented together in a silicious matrix. Rather compact; reddish grey.

(*287*) Same as No. (*286*), with same general appearance; but more open and of a reddish brown color.

(*288*) Same as No. (*286*), with same general appearance; the shells fewer in number.

Perry County.

	(289) Thos. Still.	(290)
Carbonate of lime,	71.732	89.642
Carbonate of magnesia,	7.621	1.816
Oxide of iron and alumina,	2.550	1.206
Phosphorus,	.013	.011
Silicious matter,	15.720	6.530

(*289*) *Thos. Still's quarry*, Mahonoy valley, north west

side of Dick's Hill, two miles north east of Montebello narrows. *Lewistown limestone.* 25′ exposed.

Fine-grained; brittle; numerous lenticular masses of bluish black slate; color, generally dark blue.

(*290*) *Thos. Still's quarry*, Mahonoy valley, north west side of Dick's Hill, two miles north east of Montebello narrows. *Lewistown limestone.* 25′ exposed.

This is the general character of the limestone in the exposure; but shows some of No. (*289*).

Rather coarse-grained and brittle; fossiliferous; irregularly seamed and mottled with calcite; bluish grey.

Armstrong County.

	(*291*) *Hamilton.*	(*292*) *Mehaffey & McGill.*	(*293*) *Mehaffey & McGill.*	(*294*) *Mehaffey & McGill.*
Carbonate of lime, . . .	84.857	96.453	93.214	93.571
Carbonate of magnesia, .	1.868	1.445	2.065	1.324
Oxide of iron and alumina,	2.568	.964	1.340	1.207
Phosphorus, ...	.024	.007	.004	.029
Silicious matter, ...	9.520	.830	2.200	3.170

(*291*) From *W. R. Hamilton's land*, near the coal mine; one and one half miles north from Putneyville. *Freeport Upper limestone.*

Fine-grained, tough; dark grey.

(*292*) *Mehaffey & McGill's quarry*, three fourths mile east from Logansport. *Freeport Upper limestone; top layer.*

Fine-grained and brittle; dark pearl grey.

(*293*) *Mehaffey & McGill's quarry*, three fourths mile east from Logansport. *Freeport Upper limestone; second layer.*

Fine-grained; tough; dark pearl grey.

(*294*) *Mehaffey & McGill's quarry*, three fourths mile east from Logansport. *Freeport Upper limestone; bottom layer.*

Very compact and fine-grained; hard and tough; light pearl grey with conchoidal fracture.

Armstrong County.

	(295) *Reefer.*	(296) *Marshall.*	(297) *Monroe.*
Carbonate of lime,	88.839	94.928	94.642
Carbonate of magnesia,	1.513	1.210	1.574
Oxide of iron and alumina,	2.557	1.246	1.182
Phosphorus,	.021	.018	.012
Silicious matter,	5.030	1.920	1.850

(295) *John Reefer's quarry*, three miles south west of Rural Village. *Freeport Upper limestone.*

Fine-grained; tough; mottled with calcite; dark grey; fracture conchoidal.

(296) *Wm. Marshall's quarry*, one half mile east of Dayton. *Freeport Upper limestone.*

Fine-grained; tough; mottled with calcite; dark grey.

(297) *S. Monroe's quarry*, two miles south west of Slate Lick. *Freeport Upper limestone.*

Fine-grained; tough; dark pearl grey.

Armstrong County.

	(298)	(299)	(300)
		A. J. Dull & Co.	
Carbonate of lime,	89.303	82.589	89.857
Carbonate of magnesia,	1.900	5.751	2.898
Oxide of iron and alumina,	2.002	3.367	1.860
Phosphorus,	.021	.063	.017
Silicious matter,	4.830	7.310	4.520

(298) *A. J. Dull & Co.'s quarries*, in the ravine of Fort run, near Manorville. *Freeport Upper limestone; upper layer.*

Very compact and fine-grained; dark pearl grey, with conchoidal fracture.

(299) *A. J. Dull & Co.'s quarries*, in the ravine of Fort run, near Manorville. *Freeport Upper limestone; second layer.*

Fine-grained; hard and tough; somewhat argillaceous; dark pearl grey, with conchoidal fracture; small crystals of pyrite throughout the specimen.

(300) *A. J. Dull & Co.'s quarries*, in the ravine of Fort run, near Manorville. *Freeport Upper limestone; third layer.*

Very compact and fine-grained; slightly mottled with calcite; pearl grey, with conchoidal fracture.

Armstrong County.

	(*301*) *Davis.*	(*302*) *Putney.*
Carbonate of lime,	53.750	64.160
Carbonate of magnesia,	9.989	1.838
Oxide of iron and alumina,	7.730	7.450
Phosphorus,	.131	.305
Silicious matter,	23.840	22.280

(*301*) *M. Davis' limestone*, one half mile south east of Cochran's mills. *Johnstown cement.* Outcrop specimen.

Rather coarse grained; exceedingly hard and tough; bluish grey.

(*302*) *George S. Putney's limestone*, at Putneyville. *Johnstown cement.*

Rather coarse grained; hard and tough; bluish grey; irregularly stained with carbonaceous matter.

Armstrong County.

(*303*)

Stewardson furnace.

Lime,	53.500=95.535	% carbonate of lime.
Magnesia,	.432= .907	% carbonate of magnesia.
Sesquioxide of iron,	1.114	
Sesquioxide of manganese,	.206	
Alumina,	.174	
Sulphuric acid,	.064= .025	% sulphur.
Phosphoric acid,	.082= .036	% phosphorus.
Carbonic acid,	42.399	
Water,	.150	
Silica,	2.030	
	100.151	

(*303*) *From Stewardson furnace*, one mile east from mouth of Mahoning creek, in Madison township. F. B & A. Laughlin. *Ferriferous limestone.*

Fine grained; full of fossil casts; pearl grey to reddish grey; fracture rough, slightly conchoidal.

Armstrong County.

	(*304*) *Stewardson.*	(*305*) *Colwell.*	(*306*) *Reynolds.*
Carbonate of lime,	96.007	94.721	95.567
Carbonate of magnesia,	1.498	1.044	1.422
Oxide of iron and alumina,	1.462	1.383	.930
Phosphorus,	.034	.047	.035
Silicious matter,	.790	2.300	2.110

(*304*) *Stewardson furnace* limestone, one mile east from mouth of Mahoning creek, in Madison township. F. B. & A. Laughlin. *Ferriferous limestone.*

Fine-grained; full of fossil casts; pearl grey; with conchoidal fracture.

(*305*) *J. A. Colwell's quarry*, one fourth mile north west from Mahoning furnace. *Ferriferous limestone.*

Rather compact and fine-grained; full of fossil casts; bluish grey; with conchoidal fracture.

(*306*) *Ross Reynolds' limestone*, one half mile north from Kittanning. *Ferriferous limestone.*

Fine-grained; fossiliferous; mottled with calcite; rather tough; light-pearl grey.

Armstrong County.

	(*307*) *George.*	(*308*) *Rhea.*	(*309*) *Graff.*
Carbonate of lime,	94.185	93.246	93.292
Carbonate of magnesia,	1.483	1.740	.968
Oxide of iron and alumina,	2.089	1.667	1.713
Phosphorus,	.031	.032	.047
Silicious matter,	2.100	3.420	3.220

(*307*) *P. George*, two miles west from South Bend. *Ferriferous limestone.*

Fine-grained; fossiliferous; mottled with calcite; dark grey.

(*308*) *J. C. Rhea*, one half mile west of Greendale. *Ferriferous limestone.*

Rather coarse-grained; fossiliferous; brittle; bluish grey.

(*309*) *P. Graff*, near Buffalo Mills. *Ferriferous limestone.*

Fine-grained; brittle; more or less stained with ferric oxide; fracture rough, somewhat conchoidal; color, dark grey.

Clarion County.

	(*310*) *New Athens.*	(*311*) *Reichert.*	(*312*) *Reimersburg.*
Carbonate of lime,	93.803	82.678	82.000
Carbonate of magnesia,	2.270	8.248	6.311
Oxide of iron and alumina,	.765	1.365	2.736
Phosphorus,	.008	.022	.015
Silicious matter,	1.800	5.320	7.940

(*310*) *At New Athens*, Madison township. *Freeport Upper limestone.*

Rather fine-grained; mottled and seamed with calcite; dark grey.

(*311*) *Reichert's quarry*, Perry township. *Freeport Upper limestone.*

Rather fine-grained; mottled with calcite; dark-pearl grey.

(*312*) *Three miles north east from Reimersburg*, Toby township. *Freeport Lower Limestone.*

Exceedingly hard and tough; mottled and stained with ferric oxide; color, generally bluish grey.

Clarion County.

	(*313*) *Long Run.*	(*314*) *Hindman.*	(*315*) *Sligo furnace.*	(*316*) *Barger.*
Carbonate of lime,	95.232	95.532	95.196	96.428
Carbonate of magnesia,	.407	.930	1.265	1.202
Oxide of iron and alumina,	1.310	1.050	1.529	.867
Phosphorus,	.061	.070	.081	.023
Silicious matter,	2.190	1.960	1.780	1.110

(*313*) *On Long Run*, Porter township. *Ferriferous limestone.* Bed five feet to six feet thick, with nine inches carbonate ore overlying.

Brittle; more or less stained with ferric oxide; generally pearl grey.

(*314*) *Hindman's quarry*, Clarion township. *Ferriferous limestone.*

Fine grained; mottled with calcite; rather brittle; bluish grey.

(*315*) *Sligo furnace*, Piney township. *Ferriferous limestone.*

Fine grained; rather tough; stained with ferric oxide; light bluish grey.

(*316*) *Barger quarry* Perry township. *Ferriferous limestone.*

Rather coarse grained; mottled with calcite; bluish grey.

Jefferson County.

	(*317*) *Jas. Smith.*	(*318*) *Jas Smith.*	(*319*) *Jacob. Smith.*
Carbonate of lime,	92.500	75.357	77.143
Carbonate of magnesia,	2.497	9.330	4.691
Oxide of iron and alumina,	1.530	4.230	3.790
Phosphorus,	.023	.017	.073
Silicious matter,	2.390	9.780	11.780

(*317*) *Property of James Smith*, two miles north east from Big Run. *In Lower Barren measures, 200 feet to 225 feet above Freeport upper coal.*

Rather coarse grained ; brittle ; bluish grey.

(*318*) *Property of James Smith*, two miles north east from Big Run. *In Lower Barren measures, 125 feet to 150 feet above the Freeport upper coal.*

Fine grained ; rather hard and tough ; pearl grey.

(*319*) *Property of Jacob Smith*, two miles north from Big Run. *150 feet to 175 feet above Freeport upper coal.*

Fine grained ; rather brittle with conchoidal fracture ; irregularly seemed with calcite ; dark bluish grey.

Jefferson County.

	(*320*) *Lane.*	(*321*) *Iler.*	(*322*) *Iler.*
Carbonate of lime, ...	89.107	48.571	90.000
Carbonate of magnesia, ...	1.611	23.762	2.860
Oxide of iron and alumina, ...	2.140	7.250	1.285
Phosphorus, ...	.024	.032	.011
Silicious matter, ...	6.170	16.660	3.480

(*320*) *N. B. Lane's property*, one mile south east from Brockwayville. *Freeport Upper limestone.*

Fine-grained ; brittle ; sparkles with calcite ; generally pearl grey.

(*321*) *John Iler's property*, one mile north west from Perrysville. *Freeport Upper limestone ; upper bench.*

Hard and tough ; appearance, sandy ; fracture, irregular ; color, light pearl grey.

(*322*) *John Iler's property*, one mile north west from Perrysville. *Freeport Upper limestone ; lower bench.(?)*

Rather fine-grained ; comparatively brittle ; mottled with calcite ; bluish grey.

Jefferson County.

	(*323*) *Hopkins.*	(*324*) *Huffman.*	(*325*) *Lane.*	(*326*) *Evans Round Top.*
Carbonate of lime, ...	91.875	88.928	87.035	92.857
Carbonate of magnesia, .	2.421	1.589	1.558	1.680
Oxide of iron and alumina,	1.312	1.740	2.170	2.320
Phosphorus, ...	.012	.023	.057	.019
Silicious matter, ...	3.130	6.770	8.400	2.070

(*323*) *From property of D. Hopkins*, two miles north west from Frostburg. *Freeport limestone.*

Very fine-grained and brittle; mottled with calcite; pearl grey.

(*324*) *From property of A. Huffman*, two miles north east from Worthville. *Freeport limestone.*

Fine-grained; brittle; mottled with calcite; pearl grey.

(*325*) *N. B. Lane's property*, one mile south east from Brockwayville. *Freeport Lower limestone.*

Fine-grained; hard and brittle; brownish grey.

(*326*) *From Evans Round Top*, one half mile east from Corsica. *Freeport Lower limestone.*

Fine-grained; hard and brittle; brownish grey.

Jefferson County.

	(*327*) *Lane.*	(*328*) *Iler.*
Carbonate of lime,	51.410	82.393
Carbonate of magnesia,	3.962	1.891
Oxide of iron and alumina,	7.790	4.653
Phosphorus,	.033	.300
Insoluble residue,	33.900	8.020

(*327*) *N. B. Lane's property*, one mile south east from Brockwayville. *Johnstown cement bed.*

Hard and tough; argillaceous; more or less stained with iron oxide; color, generally dark grey.

The ignited "insoluble residue" contains: Silica, 27.570; alumina, 4.800; sesquioxide of iron, trace; lime, trace; magnesia, .245. (J. M. S.)

(*328*) *John Iler's property*, one mile north west from Perrysville. *Johnstown cement bed.*

Rather hard and tough; fracture, irregular, rough; dark bluish grey.

Jefferson County.

	(*329*) *Bovaird.*	(*330*) *Hanna.*	(*331*) *Enty.*
Carbonate of lime,	94.392	93.643	96.428
Carbonate of magnesia,	1.702	1.816	.908
Oxide of iron and alumina,	1.315	1.310	.990
Phosphorus,	.031	.030	.034
Silicious matter,	1.910	2.040	1.300

(*329*) *C. Bovaird*, three miles north west from Brockwayville. *Ferriferous limestone.*

Fine grained ; brittle ; pearl grey.

(*330*) *From property of William Hanna*, two miles north east from Sprankle's mills. *Ferriferous limestone.*

Hard and tough ; fine grained ; full of fossil casts ; dark bluish grey.

(*331*) *From property of A. Enty*, one half mile south east from Worthville. *Ferriferous limestone.*

Fine grained ; brittle ; fossiliferous ; light bluish grey.

Jefferson County.

	(*332*) *Shields.*	(*333*) *Frost.*
Carbonate of lime,	96.578	39.428
Carbonate of magnesia,	.832	1.816
Oxide of iron and alumina,	.780	4.760
Phosphorus,	.037	.041
Silicious matter,	1.280	51.450

(*332*) *Samuel Shield's property*, one mile north from Dowlingville. *Ferriferous limestone.*

Rather fine grained ; fossiliferous ; sparkles with calcite ; pearl grey.

(*333*) *Near Frost's house*, four miles north east from Brookville, on Ridgeway road.

Appearance sandy ; exceedingly hard and tough ; fracture, slightly conchoidal ; color, bluish grey.

Forest County.

	(*334*) *Kelley.*
Carbonate of lime,	40.642
Carbonate of magnesia,	1.172
Oxide of iron and alumina,	2.120
Phosphorus,	.018
Silicious matter,	55.160

(*334*) *Kelley's quarry*, four miles east from Tionesta, on Tionesta creek ; Saddle Bags tract. *Tionesta limestone ;* two feet to three feet thick.

Coarse grained ; appearance, sandy ; exceedingly hard and tough ; bluish grey.

	Elk County. (*335*) *Hyde.*	(*336*) *Chamberlain.*	(*337*) *McAllister.*	(*338*) *Fox.*
Carbonate of lime,	80.357	81.875	69.357	57.321
Carbonate of magnesia,	1.619	7.189	9.308	8.854
Oxide of iron and alumina,	3.610	2.750	4.835	7.940
Phosphorus,	.086	.066	.077	.038
Silicious matter,	12.290	6.540	13.680	21.250

(*335*) *From J. S. Hyde's farm*, Horton township, one mile south from Brandy Camp P. O., on Brandy Camp creek. *Freeport upper limestone.*

Rather coarse grained and brittle; fracture irregular; light bluish grey.

(*336*) *J. S. Chamberlain's farm*, Horton township; Brandy Camp creek, one and one half miles south from Brandy Camp P. O. "*K limestone.*" *Freeport Lower limestone.*

Rather fine grained and brittle, with conchoidal fracture; light bluish grey.

(*337*) *J. C. McAllister's farm*, Horton township; Brandy Camp P. O. "K limestone of Horton township." *Freeport Lower limestone.*

Rather fine grained and brittle; fracture, sub-conchoidal; color, pearl grey.

(*338*) *T. Fox's farm*, Horton township; Mead run, three fourths mile north from Brockport. "K limestone." *Freeport Lower limestone.*

Fine grained and brittle; fracture, sub-conchoidal; bluish grey.

	Elk County. (*339*) *Winslow.*	(*340*) *Chamberlain.*	(*341*) *Brandy Camp.*
Carbonate of lime,	86.910	86.214	91.785
Carbonate of magnesia,	6.659	1.785	1.808
Oxide of iron and alumina,	2.205	2.610	1.710
Phosphorus,	.017	.050	.032
Silicious matter,	2.390	7.370	3.370

(*339*) *G. W. Winslow's farm*, two miles north east from Benezette. *Ferriferous limestone.* Ten feet thick.

Rather coarse grained; brittle; mottled with calcite and more or less stained with ferric oxide. Color, generally pearl grey.

(*340*) *One mile east from J. S. Chamberlain's farm*, from branch of Toby creek, Fox township. *Ferriferous limestone.*

Very fine grained and brittle; fracture, sub-conchoidal; dark bluish grey.

(*341*) *Brandy Camp P. O.*, Horton township. *Ferriferous limestone.*

Rather coarse grained; brittle; mottled with calcite; bluish grey.

Elk County.

	Oyster's Quarry.		
	(*342*) *Top.*	(*343*) *Middle.*	(*344*) *Bottom.*
Carbonate of lime,	27.857	54.553	49.732
Carbonate of magnesia,	.983	1.135	1.331
Oxide of iron and alumina,	3.830	3.030	3.650
Phosphorus,	.062	.104	.238
Silicious matter,	61.670	38.956	41.690

(*342*) *From Oyster's quarry*, Brockport, Horton township. *Ferriferous limestone.* 7′, more or less, thick. *Top stratum.*

Appearance shaly; fossiliferous; comparatively soft; bluish black.

(*343*) *From Oyster's quarry*, Brockport, Horton township. *Ferriferous limestone.* 7′, more or less, thick. *Middle stratum.*

Fine-grained; brittle; argillaceous; dark blue.

(*344*) *From Oyster's quarry*, Brockport, Horton township. *Ferriferous limestone.* 7′, more or less, thick. *Bottom stratum.*

Appearance shaly; fossiliferous; bluish black.

Elk County.

	(*345*) *Kane, Upper bed.*	(*346*) *Kane, Lower Bed.*	(*347*) *McAllister.*	(*348*) *Kyler's Corners.*
Carbonate of lime,	94.357	94.107	50.357	85.714
Carbonate of magnesia,	1.634	1.369	2.467	1.171
Oxide of iron and alumina,	1.638	1.626	7.040	3.422
Phosphorus,	.031	.063	.054	.069
Silicious matter,	1.630	2.200	36.860	8.390

(*345*) *Gen. Kane's quarry*, Jones township; Johnson run coal basin; four miles north east from Wilcox. *Ferriferous limestone. Upper bed.*

Fine-grained and very brittle; more or less stained with iron oxide; reddish grey.

(*346*) *Gen. Kane's quarry*, Jones township; Johnson run coal basin; four miles north east from Wilcox. *Ferriferous limestone. Lower bed.*

Rather fine-grained; brittle; somewhat mottled with calcite; dark-bluish grey.

(*347*) *J. C. McAllister's farm*, Horton township; Brandy Camp P. O. *Johnstown Cement bed.*

Appearance sandy; rather coarse-grained; very hard and tough; light-bluish grey.

(*348*) *At Kyler's Corners*, Fox township; on east side of Little Toby creek; *Clermont limestone.*

Very fine-grained; brittle; fracture conchoidal; color, bluish grey.

Elk County.

	Caledonia road.	
	(*349*) *Benezette, Upper.*	(*350*) *Benezette, Middle.*
Carbonate of lime,	36.785	76.143
Carbonate of magnesia,	1.408	1.740
Oxide of iron and alumina,	10.070	3.680
Silicious matter,	50.670	15.980

(*349*) *On Caledonia road*, one mile west from Benezette. *Benezette Upper limestone.* (Pocono). 7′ thick.

Appearance very sandy and coarse-grained; fossiliferous; light-bluish grey generally.

(*350*) *On Caledonia road*, one mile west from Benezette. *Benezette Middle limestone.* (Pocono). 7′ thick.

Appearance rather shaly; very brittle; fossiliferous; dark-bluish grey.

Clinton County.

	(*351*) *Wilsham.*
Carbonate of lime,	95.071
Carbonate of magnesia,	1.044
Carbonate of iron,	.261
Carbonate of manganese,	trace.
Sulphate of lime,	.744
Phosphate of lime,	trace.
Water and organic matter,	.220
Silicic acid,	2.660
	100.000

(*351*) *Joseph Wilsham's property*, Nippenose Valley, near Rauch's Gap. *Limestone of II.* So-called plaster. See GG, pp. 89 and 81.

Lycoming County.

	(*352*) *Wilson place.*	(*353*) *Ferguson.*	(*354*) *Bailey.*
Carbonate of lime,	70.589	60.964	72.156
Carbonate of magnesia,	1.740	30.691	20.304
Oxide of iron and alumina,	4.660	1.330	1.600
Sulphur,	.027	.100	.167
Phosphorus,	trace.	.003	.005
Silicious matter,	21.680	6.960	5.570

(*352*) *From Wilson place*, Porter twp., one half mile north from Jersey Shore. *Limestone of VI.*

Fine-grained; bluish grey; comparatively soft; argillaceous.

(*353*) *Ferguson's quarry*, Porter twp., one mile above mouth of Pine creek, and two miles west from Jersey Shore. *Limestone of VI.*

Very compact and fine-grained; light bluish grey; mottled with calcite; hard and brittle.

(*354*) *Bailey's quarry*, Porter twp., near mouth of Pine creek; two miles west from Jersey Shore. *Limestone of VI.*

Fine-grained; light bluish grey; hard and somewhat brittle; with conchoidal fracture.

Wayne County.

	(*355*) *Cherry Ridge twp.*	(*356*) *Cherry Ridge twp.*	(*357*) *Oregon twp.*	(*358*) *Oregon twp.*
Carbonate of lime,	64.392	19.785	17.696	11.196
Carbonate of magnesia,	1.816	3.518	1.589	1.664
Oxide of iron and alumina,	4.145	8.903	4.432	4.988
Phosphorus,	.050	.095	.034	.036
Silicious matter,	28.800	65.470	75.220	80.950

(*355*) *Cherry Ridge twp. Catskill limestone.*

Coarse-grained; brecciated; reddish grey.

(*356*) *Cherry Ridge twp. Catskill limestone.*

Coarse-grained; brecciated; greenish grey; sandy; slightly stained with malachite.

(*357*) *Oregon twp. Catskill limestone.*

Coarse-grained; bluish to greenish grey; with very silicious appearance.

(*358*) *Oregon twp. Catskill limestone.*

Coarse-grained; sandy; greenish grey.

CHAPTER IV.

Fire-Clays.

For a description of the different fire-clay beds and tests of fire-bricks, see Chapter IV of Report MM, pp. 257 to 279.

Elk County.

	(*359*) *Barr & Radcliffe.*	(*360*) *Dennison.*
Silica,	44.960	67.570
Alumina, (by difference,)	38.172	21.042
Protoxide of iron,	.513	.621
Titanic acid,	1.240	.930
Lime,	.120	.100
Magnesia,	.084	.147
Alkalies,	.071	traces.
Water,	14.840	9.590

(*359*) *Barr & Radcliffe mine*, two miles south west from Benezette, Benezette twp.

Rather hard and brittle; fracture conchoidal; color, pearl grey.

(*360*) *V. Dennison's farm*, Jay twp.

Hard and brittle; irregular fracture; color, pearl grey. (J. M. S.)

Elk County.

	Glen Mayo Colliery.	
	(*361*) *3' over coal bed.*	(*362*) *Average of bed.*
Silica,	51.720	56.270
Alumina, (by difference,)	21.736	23.225
Protoxide of iron,*	7.875	5.400
Titanic acid,	.870	1.190
Lime,	.060	.010
Magnesia,	2.378	2.086
Alkalies,	4.581	4.039
Water, carbonic acid, and organic matter,	10.780	7.780
	100.000	100.000

* Partly as carbonate of the protoxide of iron.

(*361*) *Glen Mayo colliery*, Ridgway township. *3′ over coal bed.*

Comparatively soft and brittle; fracture irregular; generally bluish black; portions of sample dark-pearl grey. (J. M. S.)

(*362*) *Glen Mayo colliery*, Ridgway township. *Average of bed.*

Comparatively soft and brittle; fracture irregular; color, generally dark-pearl grey.

Jefferson County.

	(*363*) *Brown, Erskine & Co.*
Silica,	44.220
Alumina, (by difference,)	38.151
Protoxide of iron,	.510
Titanic acid,	2.150
Lime,	.020
Magnesia,	.234
Alkalies,	.035
Water,	14.680
	100.000

(*363*) *Brown, Erskine & Co.*, Bellport Mills. *Fire-clay in Pottsville Conglomerate.*

Fine-grained; brittle; fracture irregular, slightly conchoidal; color, pearl grey.

Clarion County.

	(*364*) *McCauley.*	(*365*) *Sligo Fire Brick Works.*
Silica,	44.610	56.630
Alumina,	88.010	28.850
Protoxide of iron,	1.251	1.260
Titanic acid,	1.020	.990
Lime,	.080	.260
Magnesia,	.407	.079
Alkalies,	1.735	.694
Water and organic matter,	13.630	11.850
	100.743	100.613

(*364*) *J. McCauley*, three miles west from New Bethlehem, in Anthony's bend of Red Branch creek. *Fire-clay in Pottsville Conglomerate.*

Hard, brittle, dark grey; rather coarse-grained.

(*365*) *Sligo Fire Brick Works*, Sligo, Piney township. Brittle, pearl grey.

Armstrong County.

	(*366*) *Brown, Neale & Orr.*	(*367*) *Stewart.*
Silica,	50.370	55.960
Alumina,	32.890	28.415
Protoxide of iron,	1.641	1.641
Titanic acid,	1.030	1.010
Lime,	.310	.070
Magnesia,	.353	.396
Alkalies,	.290	.615
Water and organic matter,	13.760	12.690
	100.644	100.797

(*366*) *Brown, Neale & Orr*, in the ravine of Organ's run, two and one half miles north west from Kittanning. *Kittanning fire-clay.*

Comparatively soft; brittle; more or less stained with organic matter; color generally pearl grey.

(*367*) *D. Stewart*, at Kittanning. *Kittanning Lower fire-clay.*

Hard, brittle, brownish grey with conchoidal fracture.

Armstrong County.

	(*368*) *Reynolds.*
Silica,	58.750
Alumina,	25.170
Protoxide of iron,	2.195
Protoxide of manganese,	trace.
Titanic acid,	1.050
Lime,	.710
Magnesia,	.936
Alkalies,	3.535
Water,	8.110
	100.456

(*368*) *Ross Reynolds*, nearly one mile north east from Kittanning. *Fire-clay under Clarion coal.*

Soft and brittle; unctuous; pearl grey.

CHAPTER V.

Miscellaneous Analyses.

In this chapter are included the analyses of pig irons, iron ores, coals, limestones, shales and slags which have not been otherwise classified.

Pig Iron.

Armstrong County.

	(*369*) *Mahoning.*	(*370*) *Stewardson.*	(*371*) *Stewardson.*	(*372*) *Pine Creek.*
Silicium,	1.872	3.407	2.873	3.195
Sulphur,	.072	.038	.038	.043
Phosphorus,	.855	.912	.852	1.035
Manganese,	1.585	2.139	2.068	2.306

(*369*) *Mahoning furnace.* J. A. Colwell. No. 1 open grey iron.

(*370*) *Stewardson furnace*, one mile east from mouth of Mahoning creek. F. B. & A. Laughlin. No. 1 open grey iron.

(*371*) *Stewardson furnace*, one mile east from mouth of Mahoning creek. F. B. & A. Laughlin. Open-grained No. 1 iron.

(*372*) *Pine Creek furnace*, six miles north east from Kittanning. No. 1 open grey iron.

Pig Iron.

Lycoming County.

	(*373*) *Safe Harbor furnace.*
Silicium,	1.311
Sulphur,	.024
Phosphorus,	1.458
Manganese,	.202

(*373*) *Safe Harbor furnace*, Lycoming county. Old iron bolt made at this furnace and mill.

Iron Ore.

Monroe County.

	(374) *Rossland Mining Company.*
Sesquioxide of iron,	38.142
Sesquioxide of manganese,	.910
Sesquioxide of cobalt,	.010
Alumina,	4.454
Lime,	.610
Magnesia,	.828
Sulphuric acid,	.047
Phosphoric acid,	.304
Water and organic matter,	9.440
Silicious matter,	45.060
	99.805
Metallic iron,	26.700
Metallic manganese,	.634
Sulphur,	.019
Phosphorus,	.133
Phosphorus in 100 parts iron,	.498

(*374*) *Rossland Mining Company's* Rossland mine, Ross twp., two and one half miles north of the Blue mountain. R. M. Jones, Bangor, Northampton county. Sample (124 pieces) selected by Mr. H. M. Chance.

Fossil Ore of V.

Montour County.

	(375) *Liberty mines.*
Sesquioxide of iron,	62.142
Sesquioxide of manganese,	.030
Alumina,	7.284
Lime,	.450
Magnesia,	.230
Sulphuric acid,	.027
Phosphoric acid,	.224
Water and organic matter,	4.791
Silicious matter,	24.670
	99.848
Metallic iron,	43.500
Metallic manganese,	.021
Sulphur,	.011
Phosphorus,	.098
Phosphorus in 100 parts iron,	.225

(*375*) *Liberty mines*, near Mooresburg, Liberty twp. Sample from mines located on north dip of Montour ridge, in Montour county, one mile from the Catawissa branch of the P. & R. R. R. Sample is a cross section of the soft

fossil vein, so cut as to give an average of the vein. Mines owned and operated by Mr. R. M. Cummings. *Fossil ore of V.*

Magnetic Iron Ore.

Lebanon County.

	(376) *Cornwall.*
Bisulphide of iron,	.722
Magnetic oxide of iron,	61.625
Ferric oxide,	11.840
Manganic-oxide,	.195
Cobaltic oxide,	.030
Oxide of copper,	.040
Alumina,	1.936
Lime,	1.830
Magnesia,	4.544
Sulphuric acid,	1.145
Phosphoric acid,	.023
Water,	4.380
Silica,	11.330
	99.640
Metallic iron,	53.250
Metallic manganese,	.136
Sulphur,	.843
Phosphorus,	.010
Phosphorus in 100 parts iron,	.018

(*376*) *Cornwall iron ore mines*, Lebanon county. Magnetic iron ore used as a "fix" in the puddling furnaces at Paxton Rolling-mill, Harrisburg.

Adams County.

	(377) *Magnetic sand.*
Protoxide of iron,	5 785
Sesquioxide of iron,	22.428
Protoxide of manganese,	.340
Sesquioxide of chromium,	trace.
Alumina,	8.923
Titanic acid,	7.370
Lime,	3.040
Magnesia,	1.812
Water,	4.988
Silica,	42.130
Alkalies and undetermined,	3.184
	100.000
Metallic iron,	20.200

(*377*) *Magnetic sand*, from Fairfield and Gettysburg road, two miles east from Fairfield, Adams county.

Micaceous Hematite.

York County.

	(*378*) *Dare*
Metallic iron,	61.950
Sulphur,	.020
Phosphorus,	.010
Silicious matter,	9.910
Phosphorus in 100 parts iron,	.016

(*378*) *From the estate of Judge Dare*, one mile from Bowmandale, Monaghan township, York county, on bank of Yellow Breeches creek.

A foliated, micaceous hematite, carrying a small quantity of quartz sand. (J. M. S.)

Brown Hematite.

	Blair County. (*379*) *Patterson.*	*Franklin County.* (*380*) *McConnell tract.*
Sesquioxide of iron,	77.780	62.285
Sesquioxide of manganese,	trace.	1.769
Sesquioxide of cobalt,	.370	——
Alumina,	.850	1.553
Lime,	.830	.360
Magnesia,	.472	.212
Sulphuric acid,	.022	.085
Phosphoric acid,	.483	.302
Water,	11.770	10.784
Silicious matter,	7.340	22.290
	99.917	99.640
Metallic iron,	54.450	43.600
Metallic manganese,	trace.	1.232
Sulphur,	.009	.034
Phosphorus,	.211	.132
Phosphorus in 100 parts iron,	.387	.303

(*379*) *Patterson mine*, one mile south from Williamsburg, Blair county. *Brown hematite of II.* Sample brought to Laboratory by Mr. J. D. Patterson, Resident Clerk House of Representatives, 1880–81. (J. M. Stinson.)

(*380*) *McConnell tract*, about four miles west from Mer-

cersburg, Franklin county, Pa. *Brown hematite of II.* Sample sent to Laboratory by Mr. Thomas B. Kennedy, president of the C. V. R.R Company.

The following analyses (381 to 403) were made of specimens sent in to the Laboratory by Mr. John F. Carll, and their discussion will be in place in his Report on the Oil Regions.

Allegheny County.

	(*381*)	(*382*)	(*383*)	(*384*)
	Boyd's Hill gas well.			
Carbonate of iron,	21.750	16.571	10.771	8.596
Carbonate of lime,	6.892	2.678	.942	.482
Carbonate of magnesia,	2.194	1.875	1.413	1.831
Alumina,	9.670	9.651	5.152	6.050
Silicious matter,	54.360	63.270	77.340	78.500
Iron,	10.500	8.000	5.200	4.150
Lime,	3.680	1.500	.530	.270
Magnesia,	1.045	.893	.673	.872

(*381*) *Boyd's Hill gas well*, at Pittsburgh. Specimens taken from a depth of 94′to 305′. *Lower Barren measures.*

Specimens in small lumps ; of a dark grey to bluish grey color ; general appearance shaly ; contain small pieces of carbonate of iron ore.

(*382*) *Boyd's Hill gas well*, at Pittsburgh. Specimens taken at depth of 350′ to 482′. *Freeport group.*

Dark bluish grey ; lumps of fire-clay prominent ; show small pieces of carbonate ore.

(*383*) *Boyd's Hill gas well*, at Pittsburgh. Specimens taken at depth of 587′ to 612′. *Kittanning group.*

Reddish grey to bluish grey ; general appearance sandy ; show considerable white sand, with fine particles of carbonate of iron ore.

(*384*) *Boyd's Hill gas well*, at Pittsburgh. Specimens taken at depth of 642′ to 657′.

Dark bluish grey ; appearance sandy ; also shaly ; small specks of mica numerous ; a few small particles of carbonate ore.

Allegheny County.

	(385)	(386)	(387)
	Boyd's Hill gas well.		
Carbonate of lime,	64.535	38.071	59.268
Carbonate of magnesia,	2.177	1.474	1.421
Oxide of iron and alumina,	6.270	3.200	3.710
Silicious matter,	23.510	55.720	33.970

(*385*) *Boyd's Hill gas well*, at Pittsburgh. Specimens taken at depth of 879′ to 889′. *Umbral (?)*

Dark bluish grey coarse powder; small pieces of shale visible.

(*386*) *Boyd's Hill gas well*, at Pittsburgh. Specimens taken at depth of 889′ to 914′. *Umbral (?)*

Light bluish grey, inclining to greenish grey; show considerable fine white sand.

(*387*) *Boyd's Hill gas well*, at Pittsburgh. Specimens taken at depth of 889′ to 914′. *Umbral (?)*; being No. (*386*) washed and sifted.

Light bluish grey and greenish grey; not so sandy as No. (*386*).

Beaver County.

	(388)	(389)	(390)
		Economy Well No. 2.	
Carbonate of iron,	29.000	8.492	5.593
Carbonate of lime,	10.732	1.125	4.393
Carbonate of magnesia,	10.821	2.572	2.534
Alumina,	3.500	4.953	3.923
Silicious matter,	44.660	82.120	82.740
Iron,	14.000	4.100	2.700
Lime,	6.010	.630	2.460
Magnesia,	5.153	1.225	1.207

(*388*) *Economy well No. 2*, at Beaver Falls, Beaver county. Drillings from the *approximate horizon of the Sharon coal bed.* From depth of 250′ to 274′.

Dark bluish grey; small scales of mica abundant; has the general appearance of a silicious carbonate ore.

(*389*) *Economy well No. 2*, at Beaver Falls. Specimens taken at a depth of 430′ to 470′; *from approximate horizon of the Sharpsville sandstone.*

Light grey generally, with plates of bluish black shale;

appearance sandy; scales of mica abundant; small particles of carbonate ore.

(*390*) *Economy well No. 2*, at Beaver Falls. Specimens taken at depth of 1940′ to 1950′. *Berea grit* (*?*)

Light grey and dark grey; general appearance sandy; numerous small scales of mica.

Venango County.

	(*391*) *Near McClintockville.*	(*392*) *Near President.*	(*393*) *Near Franklin.*
Carbonate of lime,	29 643	31.964	37.964
Carbonate of magnesia,	.438	.658	1.188
Oxide of iron and alumina,	1.950	2.200	3.880
Silicious matter,	66.260	63.280	55.110

(*391*) *Venango county, one half mile from McClintockville, at base of Pithole grit.* 0′ to 2′ thick.

Appearance, sandy; rather fine grained; hard and tough; luster, vitreous, somewhat pearly; color, light bluish grey.

(*392*) *Venango county, one half mile from President, at base of Pithole grit.* 0″ to 6″ thick.

Appearance sandy; hard and tough: rather fine grained; luster vitreous, slightly pearly; color, dark bluish grey.

(*393*) *Venango county, one half mile south from Franklin. About 20 feet below Shenango sandstone.* 0″ to 18″ thick.

Conglomerate of quartz pebbles and silicious limestone. Color, generally bluish grey. Portion freest from pebbles selected for analysis.

Venango County.

	(*394*) *Near Fosters.*
Carbonate of iron,	48.160=23.25 per cent iron.
Carbonate of lime,	6.696
Carbonate of magnesia,	7.204 partly as silicate (mica.)
Alumina,	3.147
Phosphorus,	.505
Silicious matter,	31.980

(*394*) *Venango county, one half mile east from Fosters. Below Shenango Sandstone.*

Nodules of carbonate of iron ore; with a greyish sand-

rock containing numerous quartz pebbles and small nodules of carbonate ore.

The carbonate ore, containing numerous fossil casts, is rather fine-grained and of a dark-brownish grey color; it shows considerable mica in thin scales; also a few specks of pyrites; and is irreglarly seamed with calc-spar.

Mercer County.

	(*395*) *Snodgrass Quarry.*	(*396*) *Gibson Run.*
Carbonate of lime,	30.893	27.535
Carbonate of magnesia,	2.444	3.405
Carbonate of iron,	11.011	16.708
Alumina,	1.996	1.977
Silicious matter,	52.650	49.540
Metallic iron,	5.316	8.066

(*395*) *At base of Snodgrass flag quarry*, one half mile east from Jamestown, Mercer county. 6″ to 12″ thick. Appearance sandy; rather fine-grained; hard and tough; scales of mica numerous; luster vitreous, somewhat pearly. Color, bluish grey.

(*396*) *Gibson run*, just above Gibson well, Jamestown borough. Near top of exposed flags, 2′ to 3′ thick.

Same general appearance as No. (*395*).

Allegheny County.

	(*397*) *Deposit on tubing.*	(*398*) *Deposit along ditch.*
Carbonate of lime,	89.535	53.910
Carbonate of magnesia,	1.876	11.351
Carbonate of baryta,	4.679	8.884
Oxide of iron and alumina,	2.090	3.640
Silicious matter,	.820	19.160

(*397*) *Deposit on tubing from the water*, at Tarentum well, Allegheny county.

The deposit is very thin; has a somewhat coarse fibrous structure and greyish white color.

(*398*) *Deposit along ditch leading from Tarentum well*, Allegheny county.

The deposit consists of a thin, nodular, shelly material filled with a light brown clay. The shell after being tolerably well cleaned from the clay was analyzed.

Warren County.

	(399) Deposit on well tubing on Clapp farm.	(400)
Carbonate of lime,	94.253	95.893
Carbonate of magnesia,	1.331	1.165
Carbonate of baryta,	.626	.693
Oxide of iron and alumina,	1.090	.860
Silicious matter,	1.610	.030

(*399*) *Deposit on the outside of tubing in well on Clapp farm*, three miles south west from Tidioute, Warren county.

Deposit thin and of a greyish-white color generally. Structure for the most part granular; at places fibrous. Emits a strong petroleum odor when being ground up.

(*400*) *Deposit on tubing in well on Clapp farm*, three miles south west from Tidioute, Warren county.

Deposit $\frac{1}{2}''$ to $\frac{3}{4}''$ thick; yellowish white in color and generally fibrous in structure. It emits a strong odor of petroleum when being ground up.

Venango County.

	(401) Deposit in working barrel.
Sulphate of baryta,	94.74
Sulphate of lime,	.85
Sulphate of magnesia,	trace.
Oxide of iron,	.17
Water and organic matter,	2.13
Silica,	2.09
	99.98

(*401*) *Deposit from inside of working barrel* from well on Oil creek, Venango county (?).

Deposit thin; greyish white, with a somewhat concentric structure.

	Warren, Penna. (402) Asylum quarry rock.	Panama, N Y. (403) Panama rock.
Carbonate of lime,	98.035	98.500
Carbonate of magnesia,	1.793	.983
Carbonate of baryta,	none.	none.
Oxide of iron,	.020	.040
Silicious matter,	.010	.340

(*402*) *Deposit in vertical crevices of Asylum quarry rock*, at Warren, Pa.

Color pure white to yellowish white; structure fibrous generally; at places granular.

(*403*) *Deposit in vertical crevices of Panama rock*, at Panama, N. Y.

Consists of an almost pure white fibrous material with cavities filled with a yellowish white quartz sand. Separated from sandy portion and analyzed.

Franklin County.

	(*404*) *David Shook.*
Carbonate of lime,	96.250
Carbonate of magnesia,	.556
Oxide of iron and alumina,	.620
Phosphorus,	.026
Water and organic matter,	1.360
Silica,	1.210
	100.022

(*404*) *Mr. David Shook's farm*, Greencastle, Franklin county. *Marl.*

Sample sent to Laboratory by Rev. W. V. Ganoe. (J. M. S.)

Crawford County.

	(*405*) *Clay from gravel pit well.*
Silica,	51.010
Alumina,	20.930
Protoxide of iron,	6.831
Titanic acid,	1.090
Lime,	3.010
Magnesia,	2.511
Carbonic acid,	5.779
Alkalies,	4.372
Water,	3.840
	99.373

(*405*) *Clay from a gravel pit well* near Titusville, Crawford county. (J. M. S.)

Wayne County.

	(*406*) *Catskill Red shale.*
Silica,	59.260
Alumina, (by difference,)	19.877
Sesquioxide of iron,	10.071
Lime,	.250
Magnesia,	1.917

Sulphuric acid,	.012
Phosphoric acid,	.158
Alkalies,	4.855
Water,	3.600
	100.000
Metallic iron,	7.050
Sulphur,	.005
Phosphorus,	.069

(*406*) *Catskill Red shale*, Texas twp., Wayne county. (J. M. S.)

Armstrong County.

	(*407*) *Slag from Stewardson furnace.*
Silica,	31.800
Alumina,	12.580
Protoxide of iron,	.630
Protoxide of manganese,	.994
Lime,	48.663
Sulphide of calcium,	3.105
Magnesia,	2.101
	99.873
Sulphur,	1.378

(*407*) *Slag made at Stewardson furnace*, Armstrong county, on March 2, 1880.

Bradford County.—Coals.

Samples of coal from the same part of the Barclay bed intended to test by their analyses the effect of exposure to the atmosphere by drainage of the water in mining.

Samples were selected by Mr. F. F. Lyon, Engineer of the Barclay mines, and forwarded to the Laboratory by Mr. James Macfarlane.

	(*408*)	(*409*)	(*410*)
Water @ 225°,	.965	1.145	1.365
Volatile matter,	17.430	16.915	16.395
Fixed carbon,	69.246	73.672	71.877
Sulphur,	.709	.603	.523
Ash,	11.650	7.665	9.840
	100.000	100.00	100.000
Color of ash,	grey.	grey.	grey.
Coke, per cent.,	81.605	81.940	82.240
Fuel ratio,	1 : 3.97	1 : 4.36	1 : 4.32
Character of coke,	fair.	inferior.	inferior.

(*408*) *From the drift east from the store*, near the mouth of the drift opened in 1859.

Coke fairly coherent, slightly puffed.

(*409*) *From the Old Gatiss opening;* from a pillar exposed to the atmosphere about 10 years, near the drift mouth. But as this is a very old opening, its water must have been drained off about 25 or 30 years.

Coke inferior, powdery.

(*410*) *From mouth of Gatiss opening;* outcrop exposed to the light as well as to the atmosphere about 30 years.

Coke slightly coherent; powdery. Coal seems to alter its shape but little during coking.

	(*411*)	(*412*)	(*413*)
Water @ 225°,	1.025	1.595	1.240
Volatile matter,	17.375	16.315	17.725
Fixed carbon,	71.972	71.895	72.633
Sulphur,	.633	.575	.537
Ash,	8.995	9.620	7.865
	100.000	100.000	100.000
Color of ash,	grey.	cream.	grey.
Coke, per cent.,	81.600	82.090	81.035
Fuel ratio,	1:4.14	1:4.34	1:4.09
Character of coke,	fair.	worthless.	inferior.

(*411*) *Fresh mined coal taken from where it has always been under water.*

Coke coherent, firm; quality fair.

(*412*) *Pillar coal from inside of drift* No. 2, exposed to the atmosphere 14 years.

Coke, inferior, powdery.

(*413*) *From a piece of coal that has lain in front of the office at Barclay for nine years* exposed to the weather.

Coke, inferior, powdery.

Bradford County.—Coke.

	(*414*)
Fixed carbon,	85.517
Sulphur,	1.505
Ash,	12.978
	100.000
Color of ash,	pinkish grey.
Phosphorus,	.0076

(*414*) Coke made in Laboratory from coal from the Long Valley Coal Company's openings, two miles northeast from Barclay.

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Eshbaugh, A.,	217,	Jefferson,	Freeport Lower coal,	65
Eureka mines,	231,232,	Elk,	Coal, Alton bed,	68
Evans Round Top,	326,	Jefferson,	Freeport Lower limestone,	88
Ewing, H. M.,	170,	Armstrong,	Pittsburgh coal,	56
Fairfield,	377,	Adams,	Magnetie sand,	101

Owner's Name.	No. of Anal.	Counties.	Mineral.	Page.
Fairmount Coal Co.,	192,	Clarion,	Freeport Lower coal,	60
Fairmount Coal Co.,	197,198,	Clarion,	Freeport Lower coal,	61
Fairmount Coal Co.,	196,	Clarion,	Kittanning Middle coal,	61
Fairmount Coal Co.,	193,194,195,	Clarion,	Kittanning Lower coal,	60
Fairmount Coal Co.,	199,	Clarion,	Kittanning Lower coal,	61
Fairmount Coal Co.,	266,267, 268,269,	Clarion,	Coke,	76
Fairmount Coal Co.,	164,	Clarion,	Carbonate ore,	53
Fergusson's quarry,	353,	Lycoming,	Limestone of VI,	94
Fosters,	394,	Venango,	Miscellaneous,	105
Fox bank,	210,	Clarion,	Kittanning Lower coal,	63
Fox farm,	162,	Clarion,	Buhrstone ore,	52
Fox, T.,	338,	Elk,	Freeport Lower limestone,	91
Franklin,	393,	Venango,	Miscellaneous,	106
Frost,	333,	Jefferson,	Limestone,	90
Fuller mine,	93,93a,	York,	Magnetite,	28
Furnace Run mines,	144,	Lycoming,	Fossil ore of VIII,	45
Ganoga lake,	146,147,	Sullivan,	Carbonate ore,	47
Garlic bank,	14,	Franklin,	Brown hematite of II,	4
George, P.,	307,	Armstrong,	Ferriferous limestone,	86
George, Benj.,	26,	Franklin,	Brown hematite of II,	8
Gibson run,	396,	Mercer,	Miscellaneous,	106
Glen Mayo colliery,	361,362,	Elk,	Fire-clay,	95
Glen Mayo colliery,	239,	Elk,	Coal, Alton bed,	70
Gochenauer & Rohrer,	49,	Franklin,	Brown hematite of II,	14
Goheen's bank,	200,	Clarion,	Freeport Upper coal,	62
Goheen's bank,	201,	Clarion,	Freeport Lower coal,	62
Graff,	309,	Armstrong,	Ferriferous limestone,	86
Gravel pit well,	405,	Crawford,	Clay,	108
Gresh, E. K.,	238,	Elk,	Coal, Marshburg,	70
Grove & Co.,	60,	Cumberland,	Brown hematite of II,	18
Grove bank,	71,71a,	Cumberland,	Brown hematite of II,	21
Guilford bank,	37,	Franklin,	Brown hematite of II,	11
Guiterman & Robinson,	68,68a,	Cumberland,	Brown hematite of II,	19
Hagy, John,	188,	Armstrong,	Freeport Upper coal,	60
Hamilton, W. R.,	291,	Armstrong,	Freeport Upper limestone,	83
Hanna, Wm.,	330,	Jefferson,	Ferriferous limestone,	89
Hawbecker, S. Z.,	283,284,	Franklin,	Limestone of II,	81
Hays, Enos,	230,	Elk,	Coal,	68
Hayes mine,	143,	Lycoming,	Fossil ore of VIII,	45
Heck bank,	81,	York,	Brown hematite of II,	24
Henry Clay No. 1 bank,	68,68a,	Cumberland,	Brown hematite of II,	19
Henry Clay No. 2 bank,	67,	Cumberland,	Brown hematite of II,	19
Henry Clay No. 3 bank,	66,	Cumberland,	Brown hematite of II,	19
Hindman farm,	166,	Butler,	Carbonate ore,	54
Hindman quarry,	314,	Clarion,	Ferriferous limestone,	87
Hindman quarry,	163,	Clarion,	Buhrstone ore,	52
Hope mine,	38,	Franklin,	Brown hematite of II,	12
Hopkins, D.,	323,	Jefferson,	Freeport limestone,	88
Huffman, A.,	216,	Jefferson,	Coal,	65
Huffman, A.,	324,	Jefferson,	Freeport limestone,	88

Owner's Name.	No. of Anal.	Counties.	Mineral.	Page.
Hyde, J. S.,	335,	Elk,	Freeport Upper limestone,	91
Iler, John,	321,322,	Jefferson,	Freeport Upper limestone,	88
Iler, John,	328,	Jefferson,	Johnstown cement,	89
Johnson, Ben.,	221,	Elk,	Clarion coal,	66
Jones, Jennings,	5,	Franklin,	Brown hematite of II,	2
Kahle, Perry,	148,	Jefferson,	Brown hematite C. M.,	47
Kane, Genl.,	240,	Elk,	Coal, Hoyt bed,	70
Kane, Genl.,	345,346,	Elk,	Ferriferous limestone,	92
Kelley's quarry,	334,	Forest,	Tionesta limestone,	90
Kelly, A. B.,	165,	Forest,	Brown hematite C. M.,	53
Keslar, J.,	212,	Jefferson,	Coal,	64
Knaub bank,	81,	York,	Brown hematite of II,	24
Koontz & Myers,	70,	Cumberland,	Brown hematite of II,	20
Koser, Jacob,	46,	Franklin,	Brown hematite of II,	13
Kyler's Corners,	348,	Elk,	Clermont limestone,	92
Lane, N. B.,	327,	Jefferson,	Johnstown cement,	89
Lane, N. B.,	325,	Jefferson,	Freeport Lower limestone,	88
Lane, N. B.,	320,	Jefferson,	Freeport Upper limestone,	88
Landis or Fuller bank,	93,93a,	York,	Magnetite,	28
Lanigan & Wynkoop,	67,	Cumberland,	Brown hematite of II,	19
Laufman & Co.,	187	Armstrong,	Freeport Upper coal,	59
Laughlin, B. F. & A.,	182,	Armstrong,	Freeport Upper coal,	58
Laughlin, B. F. & A.,	265,	Armstrong,	Coke,	75
Laughlin, B. F. & A.,	151,152, 153.	Armstrong,	Buhrstone ore,	49
Laughlin, B. F. & A.,	155,159,	Armstrong,	Buhrstone ore,	50, 51
Laughlin, B. F. & A.,	156,	Armstrong,	Ore sereenings,	51
Laughlin, B. F. & A.,	303,304,	Armstrong,	Ferriferous limestone,	85
Laughlin, B. F. & A.,	370,371,	Armstrong,	Pig iron,	99
Laughlin, B. F. & A.,	407,	Armstrong,	Slag,	109
Laurel No. 1 bank,	65,	Cumberland,	Brown hematite of II,	18
Laurel No. 2 bank,	64,	Cumberland,	Brown hematite of II,	18
Lehman (J. C.) No. 2 bank,	72,	Cumberland,	Brown hematite of II,	21
Leib bank,	9,	Franklin,	Bog ore,	3
Leidig & Hoffer,	79,	Cumberland,	Brown hematite of II,	24
Liberty mines,	375,	Montour,	Fossil ore of V,	100
Liekel, Lewis,	110,	Perry,	Fossil ore of VIII,	34
Lime Kiln bank,	36,	Franklin,	Brown hematite of II,	11
Limestone Ridge M. Co.,	103,104,	Perry,	Brown hematite of VIII,	33
Logan mine,	92,	York,	Magnetite,	28
Long, J. C.,	105,	Perry,	Brown hematite of VIII,	30
Long, D. J.,	95,	Perry,	Brown hematite of VIII,	33
Long, D. J.,	97,	Perry,	Carbonate ore of VIII,	31
Long Run,	313,	Clarion,	Ferriferous limestone,	87
Longneeker mines,	88, 89,	York,	Magnetite,	27
Long Valley Coal Co.,	261,	Bradford,	Coal,	75
Long Valley Coal Co.,	414,	Bradford,	Coke,	110
Long, Borleau & Co.,	257,	Lycoming,	Coal, Bed C,	74
Loy,	94,	Perry,	Brown hematite of VIII,	30
Lucy mine,	30,	Franklin,	Brown hematite of II,	9

Owner's Name.	No. of Anal.	Counties.	Mineral.	Page.
MacNamara, Mr.,	98,	Perry,	Brown hematite of VIII,	31
Magiffin, J. S.,	150,	Jefferson,	Buhrstone ore,	48
Mahonoy Ridge,	96,	Perry,	Brown hematite of VIII,	30
Mahoning Coal Co.,	183,	Armstrong,	Kittanning Lower coal,	58
Mahoning furnace,	369,	Armstrong,	Pig iron,	99
Marshall, Wm.,	296,	Armstrong,	Freeport Upper limestone,	84
Marshall, T. H.,	175,	Armstrong,	Freeport Upper coal,	56
McAllister, J. C.,	347,	Elk,	Johnstown Cement,	92
McAllister, J. C.,	337,	Elk,	Freeport Lower limestone,	91
McCall's bank,	211,	Clarion,	Kittanning Lower coal,	63
McCarthy, Dr. A. R.,	130,	Huntingdon,	Brown hematite of VIII,	41
McCauley, J.,	364,	Clarion,	Fire-clay,	96
McCleary, Robt.,	15,	Franklin,	Brown hematite of II,	5
McClure mine,	87,	York,	Magnetite,	26
McClure, J.,	203,	Clarion,	Freeport Lower coal,	62
McClintockville,	391,	Venango,	Miscellaneous,	105
McCormick, Robt,	124,	Mifflin,	Carbonate ore of VIII,	39
McCormick & Co.,	32,	Franklin,	Brown hematite of II,	9
McCormick & Co.,	55, 56; 57,	Cumberland,	Brown hematite of II,	16; 17
McCormick & Co.,	69,	Cumberland,	Brown hematite of II,	20
McCormick & Co.,	84,	York,	Brown hematite of II,	25
McCormick & Co.,	91, 92,	York,	Magnetite,	28
McConnell tract,	380,	Franklin,	Brown hematite of II,	102
McCracken Bros.,	213,	Jefferson,	Freeport Lower coal,	64
McFarland, R. P.,	11,	Franklin,	Bog ore,	3
McGowan mine,	141,	Lycoming,	Fossil ore of VIII,	45
McHose bank,	44,	Franklin,	Brown hematite of II,	13
McIntyre Coal Co.,	244,245,	Lycoming,	Coal, Bed E,	71
McIntyre Coal Co.,	246,	Lycoming,	Coal, Bed B,	71
McIntyre Coal Co.,	262,	Lycoming,	Coke,	75
McNeal bank,	32,	Franklin,	Brown hematite of II,	9
McNutt bank,	202,	Clarion,	Freeport Lower coal,	62
Means bank,	50,	Franklin,	Brown hematite of II,	14
Medlar bank,	73,73a,	Cumberland,	Brown hematite of II,	22
Mehaffey & McGill,	292,293,294,	Armstrong,	Freeport Upper limestone,	83
Mentzer, David,	19,	Franklin,	Brown hematite of II,	6
Merriman & Co.,	243,	Clinton,	Coal,	71
Merriman & Co.,	263,264,	Clinton,	Coke,	75
Michael's Ridge,	119,	Perry,	Fossil ore of V,	37
Mill bank,	21,	Franklin,	Brown hematite of II,	6
Mine No. 3,	22,	Franklin,	Brown hematite of II,	7
Mine No. 4,	23,	Franklin,	Brown hematite of II,	7
Mine No. 5,	24,	Franklin,	Brown hematite of II,	7
Mine No. 8,	25,	Franklin,	Brown hematite of II,	8
Mine No. 3,	280,	Franklin,	Limestone of II,	80
Mine No. 4,	281,	Franklin,	Limestone of II,	80
Mineweaver, Joseph,	218,	Jefferson,	Brookville coal,	65
Mobly, Major,	167,	Butler,	Carbonate ore,	54
Monroe, S.,	297,	Armstrong,	Freeport Upper limestone,	84
Mortimer, John,	184,	Armstrong,	Brookville coal,	59
Mont Alto I. Co. estate,	17; 21,	Franklin,	Brown hematite of II,	5; 6

Owner's Name.	No. of Anal.	Counties.	Mineral.	Page.
Mont Alto I. Co. estate,	22,23, 24,25,	Franklin,	Brown hematite of II,	7
Mont Alto I. Co. estate,	26,27,28,	Franklin,	Brown hematite of II,	8
Mont Alto I. Co. estate,	30,31; 33,34,	Franklin,	Brown hematite of II,	9; 10
Mont Alto I. Co. estate,	35,36,37,	Franklin,	Brown hematite of II,	11
Mont Alto I. Co. estate,	38,39, 40,41,	Franklin,	Brown hematite of II,	12
Mont Alto I. Co. estate,	280,281; 282,	Franklin,	Limestone of II,	80; 81
Mount Holly Ore Bank Co.,	68,68a,	Cumberland,	Brown hematite of II,	19
Mount Holly Ore Bank Co.,	73,73a,	Cumberland,	Brown hematite of II,	22
Mount Holly ore bank,	73,73a,	Cumberland,	Brown hematite of II,	22
Mt. Hope Coal Co.,	242,	Cameron,	Clarion coal,	70
Mt. Hope Colliery,	241,	Cameron,	Dagus coal,	70
Mullen bank,	74,	Cumberland,	Brown hematite of II,	22
Mumper bank,	91,	York,	Magnetite,	28
Murphy, T.,	207,	Clarion,	Freeport Lower coal,	63
Mush (B. G.) & Co.,	117,118,	Perry,	Fossil ore of V,	37
Neikirk bank,	44,	Franklin,	Brown hematite of II,	13
New Athens,	310,	Clarion,	Freeport Upper limestone,	86
Newport,	286,287,288,	Perry,	Limestone of VIII,	82
North Western Mining and Exchange Co.,	227,228,229,	Elk,	Coal,	67
Oil Creek,	401,	Venango,	Miscellaneous,	107
Old mine,	76,	Cumberland,	Brown hematite of II,	22
Old mines,	250,	Lycoming,	Coal,	72
Old Mt. Pleasant,	3,	Franklin,	Brown hematite of II,	1
Old Peach Orchard bank,	60,	Cumberland,	Brown hematite of II,	17
Old Red Run mines,	248,	Lycoming,	Coal, Bed B,	72
Old Southampton bank,	47,	Franklin,	Brown hematite of II,	14
Oregon township,	357,358,	Wayne,	Catskill limestone,	94
Oyster's quarry,	342,343,344,	Elk,	Ferriferous limestone,	92
Panama,	403,	New York,	Miscellaneous,	107
Pass Orchard bank,	17,	Franklin,	Brown hematite of II,	5
Patterson mine,	379,	Blair,	Brown hematite of II,	102
Patterson, J. F.,	172,	Armstrong,	Gallitzin coal,	56
Peach Orchard (old) bank,	60,	Cumberland,	Brown hematite of II,	17
Peffer bank,	61,	Cumberland,	Brown hematite of II,	17
Pepper bank,	76,	Cumberland,	Brown hematite of II,	22
Peterman, George,	113,114, 115,116,	Perry,	Fossil ore of VIII,	35
Phila. and Reading Coal and Iron Co.'s banks,	59; 77, 77a,78,78a,	Cumberland,	Brown hematite of II,	17; 23
Pine Creek furnace,	372,	Armstrong,	Pig iron,	99
Pine Grove bank,	63,	Cumberland,	Brown hematite of II,	18
Pine Grove quarry,	278,	Cumberland,	Limestone of II,	80

Owner's Name.	No. of Anal.	Counties.	Mineral	Page.
Plaster (Ruby) bank,	48,	Franklin,	Brown hematite of II,	14
Pond No. 1 bank,	34,	Franklin,	Brown hematite of II,	10
Pond No. 2 bank,	33,	Franklin,	Brown hematite of II,	10
President,	392,	Venango,	Miscellaneous,	105
Promise mine,	39,	Franklin,	Brown hematite of II,	12
Putney, Geo. S.,	302,	Armstrong,	Johnstown cement,	85
Quiggleville mine,	142,	Lycoming,	Fossil ore of VIII,	45
Railroad bank,	7,	Franklin,	Brown hematite of II,	2
Red Bank furnace,	270,	Clarion,	Coke,	77
Red Run Coal Co.,	247,248,249,	Lycoming,	Coal,	72
Reed, D.,	186,	Armstrong,	Freeport Lower coal,	59
Reefer, Jno.,	295,	Armstrong,	Freeport Upper limestone,	84
Reichert quarry,	311,	Clarion,	Freeport Upper limestone,	86
Reimersburg,	312,	Clarion,	Freeport Lower limestone,	86
Reynolds, Ross,	185,	Armstrong,	Kittanning Lower coal,	59
Reynolds, Ross,	368,	Armstrong,	Fire-clay,	97
Reynolds, Ross,	306,	Armstrong,	Ferriferous limestone,	85
Rhea, J. C.,	308,	Armstrong,	Ferriferous limestone,	86
Rhea, J. C.,	174,	Armstrong,	Kittanning Lower coal,	56
Richmond bog bank,	2,	Franklin,	Bog ore,	1
Rinesmith,	108,	Perry,	Brown hematite of VII,	33
Rock, George,	16,	Franklin,	Brown hematite of II,	5
Rock, Jacob,	29,	Franklin,	Brown hematite of II,	9
Rogers, R.,	189,	Armstrong,	Kittanning Lower coal,	60
Romig mine,	224,	Elk,	Coal, Alton Upper,	66
Rossland Mining Co.,	374,	Monroe,	Brown hematite,	100
Ruby (Plaster) bank,	48,	Franklin,	Brown hematite of II,	14
Ruth mine,	31,	Franklin,	Brown hematite of II,	9
Rutherford opening,	56,	Cumberland,	Brown hematite of II,	16
Safe Harbor furnace,	373,	Lycoming,	Pig iron,	99
Salona ore bank,	136,137,	Clinton,	Brown hematite,	44
Schrecengost, B. U.,	171,	Armstrong,	Freeport Lower coal,	56
Schuyler, Mr.,	106,	Perry,	Brown hematite of VIII,	33
Seidel, J. B.,	109,	Perry,	Fossil ore of VIII,	34
Seyfert & McManus,	66,	Cumberland,	Brown hematite of II,	19
Shade, Dr. J. A.,	125,	Huntingdon,	Brown hematite of VIII,	40
Shelly & Hofter,	85,	York,	Magnetite,	26
Shields, Samuel,	332,	Jefferson,	Ferriferous limestone,	90
Shiery quarry,	282,	Franklin,	Limestone of II,	81
Shook, David,	404,	Franklin,	Marl,	108
Sill, James,	133,134,	Bedford,	Fossil ore of V,	43
Silver Creek mine,	233,	Elk,	Clermont coal,	69
Sligo furnace,	161,	Clarion,	Buhrstone ore,	52
Sligo furnace,	315,	Clarion,	Ferriferous limestone,	87
Sligo Fire Brick Works,	365,	Clarion,	Fire-clay,	96
Sligo Branch Coal Co.,	203,	Clarion,	Kittanning Lower coal,	63
Sligo Branch Coal Co.,	271,	Clarion,	Coke,	77
Sloan,	205,	Clarion,	Kittanning Lower coal,	63
Small, John,	27,	Franklin,	Brown hematite of II,	8
Smith, Jacob,	319,	Jefferson,	Limestone,	87
Smith, James,	317,318,	Jefferson,	Limestone,	87

Owner's Name.	No. of Anal.	Counties.	Mineral.	Page.
Smith, Henry,	107,	Perry,	Brown hematite of VIII,	33
Smith, Duncan & Avery,	12; 20,	Franklin,	Brown hematite of II,	4; 6
Smullen bank,	202,	Clarion,	Freeport Lower coal,	62
Snodgrass, Robert,	169,	Crawford,	Carbonate ore,	55
Snodgrass quarry,	395,	Mercer,	Miscellaneous,	106
Somerville, T. O.,	209,	Clarion,	Kittanning Middle coal,	63
Songer,	204,	Clarion,	Kittanning Lower coal,	63
South Mountain Mining and Iron Co.,	62,63,64,65,	Cumberland,	Brown hematite of II,	18
Southampton old bank,	47,	Franklin,	Brown hematite of II,	14
State Line and Sullivan R.R. Co.,	258,259,260,	Sullivan,	Coal,	74
Stewart, D.,	367,	Armstrong,	Fire-clay,	97
Stewardson furnace,	182,	Armstrong,	Freeport Upper coal,	58
Stewardson furnace,	265,	Armstrong,	Coke,	75
Stewardson furnace,	303,304,	Armstrong,	Ferriferous limestone,	85
Stewardson furnace,	151,152, 153; 159,	Armstrong,	Buhrstone ore,	49; 51
Stewardson furnace,	155,	Armstrong,	Roasted ore,	50
Stewardson furnace,	156,	Armstrong,	Ore screenings,	51
Stewardson furnace,	370,371,	Armstrong,	Pig iron,	99
Stewardson furnace,	407,	Armstrong,	Slag,	109
Still, Thomas,	289,290,	Perry,	Limestone of VI,	82
Stinger, Squire,	13,	Franklin,	Brown hematite of II,	4
St. Mary's Coal Co.,	234,235,236,	Elk,	Dagus coal,	69
Stouffer, Jacob,	10,	Franklin,	Bog ore,	3
Strickler bank,	75,	Cumberland,	Brown hematite of II,	22
Swayne, Benjamin,	272,	Chester,	Limestone of II,	79
Tarentum,	397,398,	Allegheny,	Miscellaneous,	106
Taylor, Isaac,	126,	Huntingdon,	Brown hematite of VIII,	40
Titusville,	405,	Crawford,	Miscellaneous,	108
Thompson, Mrs.,	176,177,178,	Armstrong,	Kittanning Upper coal,	57
Trout, Wm.,	131,	Fulton,	Brown hematite,	42
Turley, J. E.,	225,	Elk,	Coal,	67
Underwood mine,	90,	York,	Magnetite,	27
Venormer, Joshua,	122,	Juniata,	Fossil ore of V,	38
Walker, Wm.,	168,	Mercer,	Carbonate ore,	55
Wangler, J. A.,	191,	Armstrong,	Clarion coal,	60
Warren,	402,	Warren,	Miscellaneous,	107
Washer ore pit,	100,101,102,	Perry,	Brown hematite of VIII,	32
Webster bank,	12,	Franklin,	Brown hematite of II,	4
Weinman, Geo.,	8,	Franklin,	Brown hematite of II,	3
Welty's quarry,	273,274, 275,276,277,	York,	Mesozoic limestone,	79
White Rock mine,	40,	Franklin,	Brown hematite of II,	12
White & Rex,	128,129,	Huntingdon,	Fossil ore of V,	41
Wiestling bank,	41,	Franklin,	Brown hematite of II,	12
Wild Cat opening,	62,	Cumberland,	Brown hematite of II,	18
Wilkins mine,	203,	Clarion,	Freeport Lower coal,	62
Williams, J.,	220,	Jefferson,	Coal,	65
Wilsham, Joseph,	351,	Clinton,	Limestone of II,	93

Owner's Name.	No. of Anal.	Counties.	Mineral.	Page.
Wilson, H. R.,	223,	Elk,	Coal,	66
Wilson place,	352,	Lycoming,	Limestone of VI,	94
Winfield furnace,	190,	Armstrong,	Clarion coal,	60
Winslow, G. W.,	339,	Elk,	Ferriferous limestone,	91
Wolf bank,	80,	York,	Brown hematite of II,	24
Young, J.,	138,139,140,	Lycoming,	Fossil ore of V,	44

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Adams,	377,	Magnetic sand,	Fairfield,	101
Allegheny,	381 to 387,	Miscellaneous,	Boyd's Hill Gas Well,	103,104
Do.	397,398,	do.	Tarentum,	106
Armstrong,	170,	Pittsburgh coal,	H. M. Ewing,	56
Do.	172,	Gallitzin coal,	J. F. Patterson,	56
Do.	173,	Freeport Upper coal,	Beer's estate,	56
Do.	180,	do. do.	J. A. Colwell,	58
Do.	188,	do. do.	John Hagy,	60
Do.	187,	do. do.	Laufman & Co.,	59
Do.	182,	do. do.	Stewardson furnace,	58
Do.	175,	do. do.	T. H. Marshall,	56
Do.	181,	Freeport Lower coal,	J. A. Colwell,	58
Do.	186,	do. do.	D. Reed,	59
Do.	171,	do. do.	B. U. Schreecngost,	56
Do.	179,	Kittanning Upper coal,	Brooks' mine,	58
Do.	176,177,178,	do. do.	Mrs. Thompson,	57
Do.	183,	Kittanning Lower coal,	Mahoning Coal Co.,	58
Do.	185,	do. do.	Ross Reynolds,	59
Do.	174,	do. do.	J. C. Rhea,	56
Do.	189,	do. do.	R. Rogers,	60
Do.	191,	Clarion coal,	J. A. Wangler,	60
Do.	190,	do.	Winfield furnace,	60
Do.	184,	Brookville coal,	John Mortimer,	59
Do.	265,	Coke,	Stewardson furnace,	75
Do.	154,	Buhrstone ore,	Campbell & Barrett,	49
Do.	157,	do.	J. A. Colwell,	51
Do.	158,	do.	Brady's Bend Iron Co.,	51
Do.	160,	do.	Brown, Neale & Orr,	52
Do.	151,152,153,	do.	Stewardson furnace,	49
Do.	155,	do. (roasted,)	do. do.	50
Do.	159,	do.	do. do.	51
Do.	156,	do. (screenings,)	do. do.	51
Do.	291,	Freeport Upper limestone,	W. R. Hamilton,	83
Do.	292,293,294,	do. do.	Mehaffey & McGill,	83
Do.	295,	do. do.	John Reefer,	84
Do.	296,	do. do.	William Marshall,	84
Do.	297,	do. do.	S. Monroe,	84
Do.	298,299,300,	do. do.	A. J. Dull & Co.,	84
Do.	301,	Johnstown cement,	M. Davis,	85
Do.	302,	do.	George S. Putney,	85
Do.	303,304,	Ferriferous limestone,	Stewardson furnace,	85
Do.	305,	do.	J. A. Colwell,	85
Do.	306,	do.	Ross Reynolds,	85
Do.	307,	do.	P. George,	86
Do.	308,	do.	J. C. Rhea,	86
Do.	309,	do.	P. Graff,	86
Do.	366,	Fire-clay,	Brown, Neale & Orr,	97

County.	No. of anal.	Mineral.	Owner.	Page.
Armstrong,	367,	Fire-clay,	D. Stewart,	97
Do.	368,	do.	Ross Reynolds,	97
Do.	369,	Pig iron,	Mahoning furnace,	99
Do.	372,	do.	Pine Creek furnace,	99
Do.	370,371,	do.	Stewardson furnace,	99
Do.	407,	Slag,	Stewardson furnace,	109
Beaver,	388,389,390,	Miscellaneous,	Economy well No. 2,	104
Bedford,	133,134,	Fossil ore of V,	James Sill,	42
Blair,	379,	Brown hematite of II,	Patterson mine,	102
Bradford,	408 to 413,	Coals,	Barclay coal basin,	109,110
Do.	261,	Coal,	Long Valley Coal Co.,	75
Do.	414,	Coke,	do. do.	110
Butler,	166,	Carbonate ore,	Hindman farm,	54
Do.	167,	do.	Major Mobly,	54
Cameron,	241,	Dagus coal,	Mt. Hope colliery,	70
Do.	242,	Clarion coal,	do. do.	70
Centre,	135,	Brown hematite of II,	Wm. B. Addleman,	43
Chester,	272,	Limestone of II,	Benj. Swayne,	79
Clarion,	200,	Freeport Upper coal,	Goheen's bank,	62
Do.	192,	Freeport Lower coal,	Fairmount Coal Co.,	60
Do.	197,198,	do. do.	do. do.	61
Do.	201,	do. do.	Goheen's bank,	62
Do.	202,	do. do.	McNutt, (Smullen,)	62
Do.	203,	do. do.	J. McClure, (Wilkins,)	62
Do.	207,	do. do.	T. Murphy,	63
Do.	196,	Kittanning Middle coal,	Fairmount Coal Co.,	61
Do.	209,	do. do.	T. O. Somerville,	63
Do.	193,194,195; 199,	Kittanning Lower coal,	Fairmount Coal Co., 60;	61
Do.	204,	do. do.	Songer,	63
Do.	205,	do. do.	Sloan,	63
Do.	206,	do. do.	Clarion Coal Co.,	63
Do.	208,	do. do.	Sligo Branch Coal Co.,	63
Do.	210,	do. do.	Fox bank,	63
Do.	211,	do. do.	McCall's bank,	63
Do.	266,267,268,269,	Cokes,	Fairmount Coal Co.,	76
Do.	270,	Coke,	Red Bank furnace,	77
Do.	271,	do.	Sligo Branch Coal Co.,	77
Do.	164,	Carbonate ore,	Fairmount Coal Co.,	53
Do.	161,	Buhrstone ore,	Sligo furnace,	52
Do.	162,	do.	Fox farm,	52
Do.	163,	do.	Hindman quarry,	52
Do.	310,	Freeport Upper limestone,	New Athens,	86
Do.	311,	do. do.	Reichert's quarry,	86
Do.	312,	Freeport Lower limestone,	Reimersburg,	86
Do.	313,	Ferriferous limestone,	Long Run,	87
Do.	314,	do. do.	Hindman quarry,	87
Do.	315,	do. do.	Sligo furnace,	87
Do.	316,	do. do.	Barger quarry,	87
Do.	364,	Fire-clay,	J. McCauley,	96
Do.	365,	do.	Sligo Fire-Brick Works,	96
Clinton,	243,	Coal,	H. Merriman & Co.,	71

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Clinton,	263,264,	Coke,	H. Merriman & Co.,	75
Do.	136,137,	Brown hematite of II,(?)	Salona ore bank,	44
Do.	351,	Limestone of II,	Joseph Wilsham,	93
Crawford,	169,	Carbonate ore,	Robert Snodgrass,	55
Do.	405,	Clay,	Gravel pit well,	108
Cumberland,	51,	Brown hematite of II,	John H. Cressler,	15
Do.	52,	do. do.	Geo. Clever,	15
Do.	53,	do. do.	Clever No. 1 bank,	15
Do.	53a,	do. do.	"Clever No. 1 bank,"	15
Do.	54,	do. do.	John Bridges,	16
Do.	55, 56,	do. do.	Calico bank,	16
Do.	57,	do. do.	Chestnut bank,	17
Do.	58,	do. do.	Geo. H. Clever,	17
Do.	59,	do. do.	Big Pond bank,	17
Do.	60,	do. do.	Old Peach Orchard,	17
Do.	61,	do. do.	Peffer bank,	17
Do.	62,	do. do.	Wild Cat opening,	18
Do.	63,	do. do.	Pine Grove,	18
Do.	64,	do. do.	Laurel No. 2,	18
Do.	65,	do. do.	do. No. 1,	18
Do.	66,	do. do.	Henry Clay No. 3,	19
Do.	67,	do. do.	do. No. 2,	19
Do.	68,68a,	do. do.	do. No. 1,	19
Do.	69,	do. do.	Diven tract,	20
Do.	70,	do. do.	Koontz & Myers,	20
Do.	71,71a,	do. do.	Grove bank,	21
Do.	72,	do. do.	J. C. Lehman No. 2,	21
Do.	73,73a,	do. do.	Mt. Holly, (Medlar,)	22
Do.	74,	do. do.	Mullen,	22
Do.	75,	do. do.	Strickler,	22
Do.	76,	do. do.	Pepper,	22
Do.	77,77a,	do. do.	Ege,	23
Do.	78,78a,	do. do.	Beltzhoover,	23
Do.	79,	do. do.	Leidig & Hoffer,	24
Do.	278,	Limestone of II,	Pine Grove quarry,	80
Do.	279,	do. do.	Craighead,	80
Elk,	230,	Coal,	Enos Hays,	68
Do.	227,228,229,	Coal,	North-Western Mining and Exchange Co.,	67
Do.	237,	Dagus coal,	Cascade mine,	70
Do.	234,235,236,	do.	St. Mary's Coal Co.,	69
Do.	222,	Clarion coal,	Geo. Brown,	66
Do.	221,	do.	Ben. Johnson,	66
Do.	233,	do.	Silver Creek mine,	69
Do.	231,232,	Alton coal,	Eureka mines,	68
Do.	224,	do.	Romig mine,	66
Do.	226,	do.	V. Dennison,	67
Do.	239,	do.	Glen Mayo colliery,	70
Do.	223,	do.	H. R. Wilson,	66
Do.	225,	do.	J. E. Turley,	67
Do.	238,	Marshburg coal,	E. K. Gresh,	70

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Elk,	240,	Hoyt coal,	Genl. Kane,	70
Do.	335,	Freeport Upper limestone,	J. S. Hyde,	91
Do.	336,	Freeport Lower limestone,	J. S. Chamberlain,	91
Do.	337,	do. do.	J. C. McAllister,	91
Do.	338,	do. do.	T. Fox,	91
Do.	347,	Johnstown cement,	J. C. McAllister,	92
Do.	339,	Ferriferous limestone,	G. W. Winslow,	91
Do.	340,	do. do.	J. S. Chamberlain,	91
Do.	341,	do. do.	Brandy Camp,	91
Do.	342,343,344,	do. do.	Oyster's quarry,	92
Do.	345,346,	do. do.	Genl. Kane,	92
Do.	348,	Clermont limestone,	Kyler's Corners,	92
Do.	349,350,	Benezette limestone,	Caledonia Road,	93
Do.	359,	Fire-clay,	Barr & Radcliffe,	95
Do.	360,	do.	V. Dennison,	95
Do.	361,362,	do.	Glen Mayo colliery,	95
Forest,	165,	Brown hematite C. M.,	A. B. Kelly,	53
Do.	334,	Tionesta limestone,	Kelley's quarry,	90
Franklin,	1,	Brown hematite of VIII,	Bower's furnace,	1
Do.	2,	Bog ore of III,	Richmond bank,	1
Do.	9,	do. do.	Leib, (J. S. Whitmer & Co.),	3
Do.	10,	do. do.	Jacob Stouffer,	3
Do.	11,	do. do.	R. P. McFarland,	3
Do.	3,	Brown hematite of II,	Old Mt. Pleasant,	1
Do.	4,	do. do.	Beaver bank,	1
Do.	5,	do. do.	Jennings Jones,	2
Do.	6,6a,	do. do.	Carrick furnace,	2
Do.	7,	do. do.	Railroad bank,	2
Do.	8,	do. do.	Geo. Weinman,	3
Do.	12,	do. do.	Webster bank,	4
Do.	13,	do. do.	Squire Stinger,	4
Do.	14,	do. do.	Garlic bank,	4
Do.	15,	do. do.	Robt. McCleary,	5
Do.	16,	do. do.	Geo. Rock,	5
Do.	17,	do. do.	Pass Orchard,	5
Do.	18,	do. do.	Wyeth Douglas,	5
Do.	19,	do. do.	David Mentzer,	6
Do.	20,	do. do.	Smith, Duncan & Avery	6
Do.	21,	do. do.	Mill bank, Mt. Alto I. Co	6
Do.	22,	do. do.	Mine No. 3, do.	7
Do.	23,	do. do.	Mine No. 4, do.	7
Do.	24,	do. do.	Mine No. 5, do.	7
Do.	25,	do. do.	Mine No. 8, do.	8
Do.	26,	do. do.	Benj. George, do.	8
Do.	27,	do. do.	John Small, do.	8
Do.	28,	do. do.	Thos. Calliman, do.	8
Do.	29,	do. do.	Jacob Rock,	9
Do.	30,	do. do.	Lucy mine, Mt. Alto Iron Co.,	9

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Franklin,	31,	Brown hematite of II,	Ruth mine, Mt. Alto Iron Co.,	9
Do.	32,	do. do.	McNeal bank,	9
Do.	33,	do. do.	Pond No. 2, Mt. Alto Iron Co.,	10
Do.	34,	do. do.	Pond No. 1, Mt. Alto Iron Co.,	10
Do.	35,	do. do.	English mine, Mt. Alto Iron Co.,	11
Do.	36,	do. do.	Lime Kiln bank, Mt. Alto Iron Co.,	11
Do.	37,	do. do.	Guilford bank, Mont Alto Iron Co.,	11
Do.	38,	do. do.	Hope mine, Mt. Alto Iron Co.,	12
Do.	39,	do. do.	Promise mine, Mont Alto Iron Co.,	12
Do.	40,	do. do.	White Rock mine, Mt. Alto Iron Co.,	12
Do.	41,	do. do.	Wiestling bank, Mont Alto Iron Co.,	12
Do.	42,	do. do.	Wm. L. Chambers,	13
Do.	43,	do. do.	Ahl's pipe ore bank,	13
Do.	44,	do. do.	McHose (Neikirk),	13
Do.	45,	do. do.	Joseph Cressler,	13
Do.	46,	do. do.	Jacob Koser,	13
Do.	47,	do. do.	Old Southampton bank	14
Do.	48,	do. do.	Ruby (Plaster) bank,	14
Do.	49,	do. do.	Gochenauer & Rohrer,	14
Do.	50,	do. do.	Means bank,	14
Do.	380,	do. do.	McConnell tract,	102
Do.	280,281; 282,	Limestone of II,	Mt. Alto Iron Co.,	80; 81
Do.	285,	do. do.	M. E. Battin,	82
Do.	283,284,	do. do.	S. Z. Hawbecker,	81
Do.	404,	Marl,	David Shook,	108
Fulton,	132,	Brown hematite of VIII,	P. Awl & Bro.,	42
Do.	131,	Brown hematite,	Wm. Trout.	42
Huntingdon,	125,	Brown hematite of VIII,	Dr. J. A. Shade,	40
Do.	126,	do. do.	Isaac Taylor,	40
Do.	127,	Brown hematite of II,	Wm. B. Addleman,	40
Do.	130,	Fossil ore of VIII (?),	Dr. A. R. McCarthy,	41
Do.	128,129,	Fossil ore of V,	Dull & Bradley,	41
Jefferson,	212,	Freeport Lower coal,	J. Keslar,	64
Do.	213,	do. do.	McCracken Bros.,	64
Do.	214,215,	do. do.	George Blose,	64
Do.	216,	do. do.	A. Huffman,	65
Do.	217,	do. do.	A. Eshbaugh,	65
Do.	218,	Brookville coal,	Jos. Mineweaver,	65
Do.	219,	Coal,	W. B. Cowan,	65
Do.	220,	do.	J. Williams,	65
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Jefferson,	149,	Brown hematite C. M.,	Owen Butterfield,	47
Do.	148,	do. do.	Perry Kahlé,	47
Do.	333,	Limestone,	Frost,	90
Do.	317,318,	Limestone B. M.,	James Smith,	87
Do.	319,	do. do.	Jacob Smith,	87
Do.	321,322,	Freeport Upper limestone,	John Iler,	88
Do.	320,	do. do.	N. B. Lane,	88
Do.	326,	Freeport Lower limestone,	Evans Round Top,	88
Do.	325,	do. do.	N. B. Lane,	88
Do.	323,	Freeport limestone,	D. Hopkins,	88
Do.	324,	do. do.	A. Huffman,	88
Do.	327,	Johnstown cement,	N. B. Lane,	89
Do.	328,	do. do.	John Iler,	89
Do.	329,	Ferriferous limestone,	C. Bovaird,	89
Do.	330,	do. do.	Wm. Hanna,	89
Do.	331,	do. do.	A. Enty,	89
Do.	332,	do. do.	Samuel Shields,	90
Do.	363,	Fire-clay,	Brown, Erskine & Co.,	96
Juniata,	121,	Brown hematite of VIII,	Mr. Clark,	38
Do.	122,	Fossil ore of V,	Joshua Venormer,	38
Lebanon,	376,	Magnetite,	Cornwall ore bank,	101
Lycoming,	244,245,246,	Coal,	McIntyre Coal Co.,	71
Do.	247,248,249,	do.	Red Run Coal Co.,	72
Do.	250,	do.	Old mines,	72
Do.	251,252, 253,254,	do.	English mines,	73
Do.	255,	do.	Bannan mine,	74
Do.	256,	do.	J. W. Baché,	74
Do.	257,	do	Long, Borleau & Co.,	74
Do.	262,	Coke,	McIntyre Coal Co.,	75
Do.	145,	Carbonate ore,	Cartersville furnace,	46
Do.	141,	Fossil ore of VIII,	McGowan mine,	45
Do.	142,	do. do.	Quiggleville mine,	45
Do.	143,	do. do.	Hayes mine,	45
Do.	144,	do. do.	Furnace Run mines,	45
Do.	138,139,140,	Fossil ore of V,	J. Young,	44
Do.	352,	Limestone of VI,	Wilson place,	94
Do.	353,	do. do.	Fergusson's quarry,	94
Do.	354,	do. do.	Bailey's quarry,	94
Do.	373,	Iron,	Safe Harbor furnace,	99
Mercer,	168,	Carbonate ore,	Wm. Walker,	55
Do.	395,	Miscellaneous,	Snodgrass quarry,	106
Do.	396,	do.	Gibson Run,	106
Mifflin,	124,	Carbonate ore,	Robt. McCormick,	39
Do.	123,	Fossil ore of V,	J. J. Dull,	39
Monroe,	374,	Brown hematite,	Rossland Mining Co.,	100
Montour,	375,	Fossil ore of V,	Liberty mines,	100
Perry,	120,	Red hematite of IX,	Christian Basom,	37
Do.	97,	Carbonate ore,	D. J. Long,	31
Do.	94,	Brown hematite of VIII,	Loy,	30
Do.	95,	do. do.	D. J. Long,	30
Do.	96,	do. do.	Mahonoy Ridge,	30

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Perry,	98,	Brown hematite of VIII,	MacNamara,	31
Do.	99,	do. do.	Barnitz,	31
Do.	100,101,102,	do. do.	Washer Ore Pit,	32
Do.	103,104,	do. do.	Limestone Ridge Mining Co.,	33
Do.	105,	do. do.	J. C. Long,	33
Do.	106,	do. do.	Mr. Schuyler,	33
Do.	107,	do. do.	Henry Smith,	33
Do.	108,	Brown hematite of VII,	Rinesmith,	33
Do.	109,	Fossil ore of VIII,	J. B. Seidel,	34
Do.	110,	do. do.	Lewis Lickel,	34
Do.	111,	do. do.	Philip Cook,	34
Do.	112,	do. do.	Cumbler,	35
Do.	113,114,115,116,	do. do.	Geo. Peterman,	35
Do.	117,118,	Fossil ore of V,	B. G. Mush & Co.,	37
Do.	119,	do. do.	Michael's Ridge,	37
Do.	286,287,288,	Limestone of VIII,	Newport,	82
Do.	289,290,	Limestone of VI,	Thos. Still,	82
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Do.	393,	do.	Franklin,	105
Do.	394,	do.	Fosters,	105
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Wayne,	406,	Catskill red shale,	Texas township,	108
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Do.	357,358,	do.	Oregon township,	94
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Do.	82,	do. do.	Coover & Wolf,	24
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Do.	84,	do. do.	McCormick & Co., (Atticks,)	25
Do.	85,	Magnetite,	Shelly & Hoffer,	26
Do.	86,	do.	Bell mine,	26
Do.	87,	do.	McClure mine,	26
Do.	88,	do.	Longnecker old mine,	27
Do.	89,	do.	Longnecker new mine,	27
Do.	90,	do.	Underwood,	27
Do.	91,	do.	Mumper, (McCormick & Co.,)	28
Do.	92,	do.	Logan, (McCormick & Co.,)	28
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SECOND GEOLOGICAL SURVEY
OF PENNSYLVANIA
J.P.LESLEY, STATE GEOLOGIST

REFERENCE MAP
OF
NINETY THREE IRON ORE MINES
IN THE COUNTIES OF
CUMBERLAND, YORK AND FRANKLIN.

SAMPLED AND ANALYSED BY
Andrew S McGroth
1881

Scale 2 miles = 1 inch

M3.

KEY LIST OF ORE BANKS.

1. Bowers Furnace Ore bank
2. Richmond Furnace Big bank
3. Old Mt. Pleasant bank
4. Beaver bank
5. Jennings Jones bank.
6. Old Carnek Furnace bank
7. Railroad bank
8. George Weinman bank
9. Leib bank (J. S. Whitmer & Co)
10. Jacob Stouffer's bank.
11. R. P. McFarland's bank
12. Webster bank.
13. Squire Stinger's old bank.
14. Gerlie bank
15. Robt. McClearry's bank
16. George Rock "
17. Penn Orchard "
18. Wyeth Douglas "
19. David Mentzer opening
20. Smith, Duncan & Avery bank
21. Mill bank.
22. Mine No 3 bank (Mt. Alto Iron Co)
23. " No. 4 " "
24. " No. 5 " "
25. " No. 6 " "
26. Benjamin George opening
27. John Small bank
28. Thomas Callinan bank
29. Jacob Rock "
30. Lucy mine
31. Ruth mine
32. McNeel bank
33. Pond No 2, or Little Pond bank
34. Pond No. 1 bank
35. English "
36. Lime Kiln "
37. Guilford "
38. Hope mine
39. Promise mine
40. White rock mine
41. Wiestling bank
42. Wm. L. Chamber's openings
43. Ahl's bank
44. McHose bank (old "Nesbitt" bank)
45. Joseph Cressler bank
46. Jacob Kover "
47. Old Southampton"
48. Ruby or Plaster "
49. Gochenaur & Rohrer bank
50. Mean's bank "
51. John H. Cressler (old "Clippenger" bank)
52. George Clever bank
53. No. 1 Clever mammoth bank
54. John Bridges opening
55. Calico bank Coover opening
56. " " Rutherford "
57. Chestnut bank
58. George H. Clever bank
59. Big Pond "
60. Old Peach Orchard "
61. Pfeffer bank
62. Wild Cat openings
63. Pine Grove bank
64. Laurel No 2 "
65. " No. 1 "
66. Henry Clay No 3 bank
67. " " No 2 "
68. " " No 1 "
69. Driven Tract openings
70. Koontz & Meyers.
71. Grove bank
72. J. C. Lehman No 2 bank.
73. Mount Holly bank (median)
74. Mullen bank
75. Strickler "
76. Pepper, " ("old mine")
77. Ege bank.
78. Beltzhoover bank.
79. Lesig & Hoffer bank.
80. Wolf bank
81. Heck " (old "Kneuh" bank)
82. Coover & Wolf bank
83. C. H. Bender bank.
84. McCormick & Co's bank
85. Shelly & Hoffer "
86. Bell mine
87. McClure bank (King & Jones)
88. Longnecker mine.
89. " new opening
90. Underwood mine.
91. Mumper bank.
92. Logan bank (McCormick & Co)
93. Landis or Fuller bank.

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